The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. VIII. No. 205 MAY 19, 1923 Prepaid Annual Subscription United Kingdom, £1.1.0; Abroad, £1.6 0.

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices—8, *Bouverie St., London, E.C.4.*
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines).

Town's Gas Developments

As anticipated in our last issue, further light was obtained on the recent reports as to the production of town's gas free from carbon monoxide by a visit of inspection which a number of guests paid last week to the Tully gas plant at the Bedford gasworks. What the visitors actually saw in operation had nothing directly to do with any new process. They simply saw the plant which Tully Gas Plants, Ltd., installed some time ago, and which, we believe, is the largest the company has yet constructed. The plant embodies the principle of complete gasification, and the directors and engineer spoke in high terms of its efficiency. Whether it is better completely to gasify coal in this way, leaving no residuals except ash, or partially to gasify it and treat the residuals separately is, of course, a commercial or economic problem on which gas authorities may take different views, according to circumstances and ruling prices. The Bedford gas directors, in any case, are obviously well satisfied with the complete gasification system and with the plant which the Tully company has installed.

Mr. Tully's further process, which was verbally described to the visitors, for the elimination of carbon monoxide from town's gas is something quite additional to the existing Tully gas plant. It is still in the experimental stage and no commercial plant is yet in operation. From Mr. Tully's explanation, it appears that the gas under his process is passed over a catalyst—understood to be activated oxide of iron, and consisting of quite small and short corrugated cylinders so as to ensure perfect contact—and that the CO is thus converted into CO_2 and hydrogen. The CO_2 is washed out, and the gas, thus purified, goes into the holder for use.

This in itself seems simple enough, but the washing out of the CO_2 raises a further problem, because if the operation ceased at this point the CO_2 would simply be lost. To avoid this waste, yet another process has to be brought into play. In this it is proposed to utilise the CO_2 and hydrogen (into which the CO by the addition of steam has been previously converted) for the production of methane—a problem which, we understand, has already engaged the attention of investigators such as Sabatier, Senderens, and Vignon, and which admittedly is not free from difficulties on a commercial scale. It would be premature to discuss this last development further at this stage, but what has been said may help roughly to define the present position. It will thus be seen that, while the existing Tully gas plants represent the operation of the familiar principle of complete gasification, Mr. Tully's process for the elimination of CO is an additional operation, and may be regarded as a possible starting point for further developments. At this early stage, perhaps, that is as much as it is permissible to say.

Integral Waterproofings for Concrete

JUDGING from the inquiries received, it would seem that so many of our readers are interested in the properties of concrete and methods for rendering it waterproof that they will appreciate having their attention drawn to those developments which show promise of providing a practical solution to their every-day problems. As a material of construction, concrete has assumed a very definite importance within the last few years, but its progress in connection with chemical works has not been so pronounced as in other branches of industry, for the reason that the chemical engineer is frequently confronted with conditions and demands which are exceptional and call for special treatment.

Professor A. H. White of Michigan University has been working on problems of the kind for a considerable time, and he recently demonstrated some important facts in connection with the behaviour of concrete and cement masses. Attention is drawn to the fact that concrete retains the properties of a colloid to an undiminished extent for at least twenty years, and that it has been the tendency of engineers to test it when it is wet, so that most of the results which have shown

concrete to be waterproof have been made on the material with its colloid fully swollen. Concrete which is properly made in a fairly rich mixture and thoroughly hardened under water will not permit any water to pass through it because the swollen colloid closes all the capillary pores. In explaining resistance to water absorption Professor White points out that one of the products formed by reaction of Portland cement and water is hydrated lime, which is relatively soluble in water. When the block with its pores filled with water is allowed to dry in the air, it is not pure water but a saturated solution of calcium hydroxide that travels to the surface of the block. This becomes converted to calcium carbonate through reaction with the carbon dioxide of the air, and the calcium carbonate thus deposited seals the capillary openings just as on a larger scale it stops up the tubes in a steam boiler. The surface of fairly rich concrete which is alternately wet and dried will, therefore, waterproof itself in time through deposition of calcium carbonate. The waterproofing will, however, reside mainly in the skin, and the centre of the mass will still have capillary openings. These capillary openings will be smaller in old concrete which has had long immersion in water, because they have become partly filled with colloid. Dry concrete will, however, always have capillary canals.

Attention is also given to the effect of a number of waterproofing materials such as hydrated lime, clay, petroleum residues, and insoluble soaps, the last two of which seem to play a useful part, but which the structural engineer might be inclined to regard with suspicion in the absence of any definite knowledge that they are not injurious to strength. From the tests conducted with soap solutions it is evident, however, that where a small proportion of fatty acids is added the compressive strength is greater than when no waterproofing material is used.

A Great Chemist

PROFESSOR PERKIN in the Baeyer Memorial Lecture, given before the Chemical Society last week, directed the attention of the present generation of chemists to the life and methods of one who may be justly described as one of the founders of organic chemistry. Dr. Perkin is well qualified to speak of Baeyer, as he had the privilege of working in his laboratories at Munich. An outstanding point is that Baeyer was essentially an experimenter. The theories he formed were based on experiments; he did not follow the reverse process of forming a theory and then devising experiments to prove it. His experiments, moreover, were carried out with the simplest apparatus, usually nothing more than scrupulously clean test-tubes and glass rods. Probably no chemist has ever achieved so much with so little expenditure of material. His investigations were carried out with a persistence to which he personally attributed the success of his work. He worked largely alone, and though he frequently coupled the name of an assistant in his published researches, usually there was little that could be called collaboration, with the exception only of the work he did with Victor Wilstätter.

Baeyer allowed nothing to stand in the way of the progress of his research, and except that he appears to have taken a delight in lecturing, he confined his activities to his main object, resolutely refusing to have any part in the local questions of the university, for instance. The result is that the name of Baeyer is associated with nearly all the "standard subjects" in organic textbooks. The three great synthetic esters—acetoacetic, malonic and succinic—are all associated with his name. He did valuable work on the sugars and in many other directions too numerous to mention, but his crowning achievement, though one of the earliest, was probably his discovery of the synthesis of indigo from isatin. It was probably characteristic of him that he refused to assist in the technical difficulties of indigo manufacture, as he was then engaged on other research. His devotion to pure chemistry does not, however, diminish the value of his contribution to science or to the industry that has been built upon it.

Annual Report on Explosives

THE annual report of H.M. Inspectors of Explosives contains the satisfactory statement that for the first time in the history of the manufacture of explosives in the United Kingdom no fatal accident has occurred during the year in a factory established under the Explosives Act. The total number of accidents reported during the year was 380, causing 52 deaths and injuries to 373 persons. This represents an increase in the total number, in the number of deaths, and in the number of injured. The previous year's figures, however, were unusually favourable because of the stoppage of work in coal mines from April to July. The average figures for the years 1905 to 1914 were: Accidents, 434·5; deaths, 56·1; persons injured, 433·9. Over 97 per cent. of the accidents causing death or personal injury occurred in the illegal manufacture of explosives and under conditions to which the controlling provisions of the Explosives Act do not apply. For the satisfactory results recorded, the inspectors state, the numerous precautions adopted to minimise the risk of injury in case of accident during manufacture must be regarded as largely responsible.

Among the cases of accidents in the course of illegal manufacture was a fatal accident to a woman who carried on the business of druggist, and who was killed by an explosion which occurred while she was mixing chlorate of potash and sulphur in a large porcelain mortar, using a heavy porcelain pestle with wooden handle for the purpose. On July 14 of last year a new Order in Council was made repealing and consolidating all previous orders relating to the keeping of calcium carbide. In this section attention is drawn to an explosion of acetylene gas on a steamer. One of the crew was carrying a drum of calcium carbide down the engine-room ladder when he slipped and the drum fell into the crank-race of the engine, and the carbide, escaping into the water in the bilge, generated a large volume of acetylene, which at once exploded. Accidents of this nature, it is suggested, might be avoided by the simple precaution of taking all carbide drums below and placing the carbide in its proper receptacle before the engines are started.

In the report of the chemical advisers, Messrs. F. H. and P. V. Dupré, it is stated that the total

number of samples examined during the year amounted to 357. The number of samples (42) adversely reported on is normal, although it amounts to nearly 12 per cent., but two-thirds of these samples contained faults in composition other than that of excess moisture. The errors are therefore due to faulty manufacture, not to improper storage, the number of samples reported against for this reason thus being 50 per cent. higher than it was last year. Twelve samples of new explosives passed the tests, while three others passed the preliminary examination; none were rejected. An accident occurred during the year said to have been caused by the spontaneous ignition of gelignite while being thawed in a hot-water pan. Four cartridges from the same batch were examined and found to be of fair quality. The most stringent tests were applied to all four cartridges, and, in consequence of the results given, the advisers have no hesitation in saying that, if the cartridges received by them were anything like that concerned in the accident, the explanation given was not the correct one. This conclusion, it is added, is strengthened by the experience of many years, during which an enormous amount of gelatinous explosives has been thawed in the same way without any accident.

An Applied Science Exhibition

WE learn from Mr. F. W. Bain (chairman of the exhibition committee) that in connection with the meeting of the British Association in Liverpool, September 12 to 19, it is proposed to hold a scientific exhibition at which there will be exhibits of all the latest apparatus in connection with each section of the Association, and at which there will also be exhibits showing the most recent advances in applied science. This is the first time that a comprehensive scientific exhibition has been organised in connection with the British Association, and it will form a special feature of the Liverpool meeting. The exhibition will be held in the buildings of the Central Technical Schools, Byrom Street, Liverpool, which have been granted for this purpose by the Technical Education Committee of the Liverpool Corporation. The buildings are extensive and centrally situated, while the electrical and other facilities are admirably adapted for the purpose of such an exhibition. It is anticipated that all the leading manufacturers of scientific apparatus in the country will be represented.

The exhibition will be open to members of the Association during the period of the meeting, but in view of the fact that the exhibition is the first of its kind, and will undoubtedly appeal to the public interest in scientific achievement, it is intended to extend the period of the exhibition from September 10 to September 22, and allow admittance to the public at a small charge. A special committee representing all sections of the Association has been formed for organisation purposes.

Seizure of German Dyeworks

A MARKED advance is announced in the policy of France towards Germany. This week three of Germany's most important dyeworks, including that of the Badische Co., were occupied by troops. The Höchst dyeworks at Höchst-on-Main were surrounded, and when the twelve hundred workers for the morning shift arrived they were refused admission. The chemical factory of Weiler Ter Mer, in Merdigen, was also occupied. The French are said to have announced at Ludwigshafen that the object of the occupation is the seizure and removal to France and Belgium of the reparation dyes due to those countries, and that it is not a "sanction," but a "restitution" measure. The operation of removing the dyes is expected to last a week, during which the buildings in which reparation dyes are manufactured and stored will be held by troops and no persons allowed to enter them. The question has been raised as to the effect of French action on deliveries of British reparation dyestuffs and on dyestuffs exported to Great Britain under license. As to reparation dyes, there were some time ago large unconsumed stocks in this country, but these may recently have been reduced; with respect of dyes imported here under license—and therefore obviously necessary for trade—it has been arranged as far as possible to keep these going. It will be remembered that the latter now amount to about 10 per cent. of the total dyestuff consumption in this country, and that, owing to the development of British production, the situation is less serious than it might otherwise have been.

Points from Our News Pages

Mr. Rex Furness contributes an article on "The Production and Uses of Lamp Black and of Carbon Black" (p. 532).

Professor Donnan gives some impressions of his visit to America (p. 534).

The Baeyer Memorial Lecture was delivered before the Chemical Society on Thursday in last week by Dr. W. H. Perkin (p. 536).

A report is given of the latest developments in the Tully gas plant (p. 538).

The annual dinner of the Oil and Colour Chemists' Association was held on Wednesday (p. 540).

Professor Bone lectured on Friday last week at the Royal Institution on the discoveries made as a result of investigations on "Gaseous Combustion at High Pressures" (p. 541).

Trade is stated in our London Market Report to be rather slow, with prices firm and stocks of most chemicals on the low side (p. 549).

Books Received

THE PHASE RULE. By A. C. D. Rivett. Oxford: The Clarendon Press. Pp. 204. 10s. 6d.

BY-PRODUCT COKING. By G. Stanley Cooper. London: Benn Brothers, Ltd. Pp. 192. 12s. 6d.

THE MANUFACTURE OF HYDROCHLORIC ACID AND SALTCAKE. By Alexander Charles Cumming. London: Gurney and Jackson. Pp. 423. 31s. 6d.

RAW MATERIALS FOR THE MANUFACTURE OF SULPHURIC ACID AND THE MANUFACTURE OF SULPHUR DIOXIDE. By Wilfrid Wyld. London: Gurney and Jackson. Pp. 558. 36s.

The Calendar

May 22	Northern Polytechnic Institute, Chemical Association: "The Acceleration of Vulcanisation." P. Schidrowitz. 8 p.m.	Holloway, London, N.
31	Royal Institution of Great Britain: "The Nature of Enzyme Action." Sir William M. Bayliss. 3 p.m.	Albemarle Street, Piccadilly, W.1.

Production and Uses of Lamp Black and of Carbon Black

By Rex Furness

In the following article the writer discusses the methods by which lamp black and carbon black are produced, all the methods depending upon the incomplete combustion of a hydrocarbon oil or suitable carbon containing substance or of the methane contained in "natural gas." The extremely small yields obtained are noted, but the processes of producing carbon by pyrogenetic decomposition of gas or oil in retorts, whilst returning much greater yields, are shown to be inapplicable at present, by reason of the low pigment value and low covering power of the carbon so produced.

THE use of lamp black and of carbon black—gas carbon—as a component of printing inks is a very old practice. Gas carbon only began to be used in 1864, it is true, but it has won its place in competition with the older lamp black, especially in America, where natural gas is available in large quantity to serve as a cheap raw material for the manufacture of gas carbon. The superior colour intensity of gas carbon, together with the economies capable of being effected in its use, have been amply demonstrated, and nearly 20,000,000 lb. are consumed annually in the printing of American newspapers, magazines, journals, etc.

In these days of high speed printing, it is essential that a satisfactory printing ink shall possess several well defined characteristics, many of which are dependent upon the pigment—carbon—used, whilst others are, of course, determined by the oily base of the ink. Thus, the ink should be of a uniform syrupy consistency, and should be capable of easy transference from the ink roller to the type, and from the latter to the paper. It should be non-smudging, and should be capable of easy removal from the type. The drying of the ink should not be so rapid as to take place on the type, but, on the other hand, it should be sufficiently quick as to allow of rapid folding of the printed page. Moreover, when dry, the pigment should not be removable by contact with the hands, with adjacent sheets of paper, etc. Carbon black produced from natural gas has a greater covering power and pigment value than most grades of lamp black, and consists of fine particles, free from gritty aggregations. According to the quality of the black, a greater or less amount is required in the ink, but, in general, with good quality black, about 20–25 per cent. of lamp black is employed in the ink for high speed rotary presses, whilst somewhat less is employed in ink for book printing. In the case of gas carbon of good quality, it has been stated that ink for newspaper printing can be prepared with much less than the above amounts. Thus, 1 lb. of good carbon black mixed with about 8 lb. of oily vehicles, etc., suffices for the printing of 2,250 newspapers of 16 pages.

While considering the applications of the carbon blacks in the production of printing inks, it may be noted that coal tar dyes are being applied to some extent to-day, and a still cheaper ink is foreshadowed. Some of the dyes possess the property of ready bleaching, moreover, and this is of great advantage when the recovery of newspaper, or other printed paper for re-use, is contemplated. An example may be cited in Columbia Black FF, which forms a calcium or barium salt which is very fast to light, and may prove of great use in the manufacture of printing inks. The dye is of complex structure, and may be classed in the trisary of dye series. An equally important application of carbon black is to be found in the rubber tyre industry. Over 20,000,000 lb. of gas carbon were used last year in the industry. The employment of gas carbon, somewhat in the nature of a filler, confers valuable properties upon the rubber. The toughness and resiliency are increased, whilst the tensile strength is improved. A longer life and greater mileage is possible with tyres made from rubber "filled" with a good gas carbon. In no way can the poorer forms of carbon, such as that produced by pyrogenetic decomposition of natural gas or of oil in retorts, be substituted for the form deposited upon plates after the incomplete combustion of natural gas. The smooth, finely divided carbon, free from soluble matter and grit, gives incomparably better results, and this is held to justify the continuance of carbon black manufacture, in spite of the fact that the efficiency of manufacture is only a few per cent.—a point which is discussed more fully below.

Other uses to which carbon black is applied are dependent upon its high pigment value. Thus, large quantities are used in the manufacture of stove and shoe polishes, of typewriter carbon papers, in the production of "Chinese" and "Indian" inks, and for the colouring of many other substances, such as cement, leather, etc.

Lamp Black Manufacture

The production of the finely divided form of carbon known as lamp black depends upon the incomplete combustion of carbon containing substances, and, in particular, fatty or resinous materials may be noted, whilst tars and hydrocarbon oils are also employed. The methods of collecting the decomposition products, and separating the carbon by deposition upon a plate, or filtration from the gases of combustion by means of cloths, require no elaboration. The old German method of incompletely burning resinous woods and passing the "smoke" through woollen cloths for the collection of the lamp black may serve as an example. The adjustment of air is effected by carrying out the combustion in gas tight furnaces, and with suitable air regulation.

Newer methods are, however, being sought, but it still remains to be proved that the quality of the black produced is sufficiently high. It is by no means impossible that, in the endeavour to increase the yield of fixed carbon, the quality suffers, much in the same way as occurs when increased yields are realised in the thermal decomposition of natural gas in retorts, in place of incomplete combustion under collecting plates.

The process of Hutchins (British Patents Nos. 124,557 and 126,550) may be briefly described in this connection. A carbon or graphite wheel or disc rotates in a trough containing suitable tarry material or hydrocarbon oil, and the thin film of oil upon the periphery is subjected at a certain point to the sudden and intense heat of the electric arc, struck between conveniently disposed poles—the disc itself may serve as one pole. An oxy-hydrogen flame may be used in place of the electric arc if desired. The disc is enclosed in an air-tight casing, and air regulation is affected so that carbon and oxidation products are produced. The carbon is separated by means of a bag filtering system. It is claimed that high yields of an excellent carbon lamp-black are obtained. It is possible that the rapid cooling which is capable of realisation, and the exact regulation of the air supply, may achieve the double purpose of high yield and high quality product. It may be noted, however, that the carbon produced by the thermal decomposition of oil in retorts, such as occurs in the Pictet process of hydrogen manufacture (British Patents Nos. 13,397 and 14,703 of date 1911) is of very inferior quality, and cannot be used as a substitute for carbon black or lamp black. The only company working a process of this type makes no use of the carbon produced, the process being concerned with the production of hydrogen only.

Before passing to a consideration of the highly developed art of gas carbon production from natural gas, it may be noted that a new process for the production of lamp black as a by-product has recently been described. By the action of calcium carbide upon alkali metal chlorides at a high temperature, the free alkali metal is obtained, whilst lamp black is left after removal of the metal by distillation. It is not yet known, however, to what grade the carbon belongs, and practical experiments for settling its value as a pigment, as a filler for rubber, etc., have not yet been reported. The process, provided cheap calcium carbide is available, should possess advantages, especially if a good grade carbon prove to result as a side product.

Carbon Black or Gas Carbon?

The type of carbon known as gas carbon or carbon black has been produced in America since 1864, and, as its name suggests, is manufactured from natural gas. By the incomplete combustion of the hydrocarbons—principally methane—

contained in the natural gas, and with regulated supply of air, free carbon remains in the flame, and can be recovered by deposition upon suitable cooling plates. The process returns at most only 5 per cent. of the carbon contained in the natural gas, the remainder being consumed, and lost in the form of combustion products, whilst the heat generated is also lost. The process can, therefore, only be put into practice in those countries well endowed with natural gas supplies. In America, the home of the industry, the many installations differ in detail, principally in the form of the cooling plates or surfaces upon which the gas carbon is deposited. Four types of deposition surfaces are employed, namely, long narrow " channels," small rotating discs, large plates, capable of rotation or fixed, but with rotating burners for the gas, and rotating cylinders. Of these types, the first or " channel " system is that most extensively employed. The largest producing factory in the world, however, makes use of the plate system. The last type, the rotating cylinder, produces an excellent grade of carbon, but is comparatively little operated.

The success of the process of producing gas carbon depends upon careful attention to mechanical details of the plant, together with, of course, attention to air regulation and uniformity of gas supply, and the principle is exactly the same—the incomplete combustion of methane—so that a brief indication of the differences of deposition surfaces will be given, and the reader may be referred for full details of construction, etc., to the excellent review published by Neal (*Chem. & Met. Eng.*, 1920, 729 and 785).

In the channel system the natural gas is supplied under a constant pressure head, to burners fitted with lava " tips " which are disposed about 4 in. below the cooling or deposition plates.

In good practice the petrol contained in the natural gas is removed by compression, cooling, or absorption in a washing oil or in highly absorptive carbon, before the gas is burnt under the channels. The amount of gas consumed varies according to conditions, but a production of 1 lb. of carbon from 800 c. ft. of gas is about the best that can be attained.

The surfaces upon which gas carbon is deposited in the rotating disc type of plant consist of circular discs, 36–42 in. in diameter, constructed of cast iron and arranged in suitable buildings, with appropriate ventilation. The gas is supplied to lava tips, the burners being arranged in a circular iron supply pipe, 28 in. in diameter. Fixed scrapers and hoppers for the reception of the carbon removed from the rotating discs are provided. The gas supply is regulated, and, on amount is of the same order as in the channel process, whilst the cooling surface is similarly proportionate. The discs make one revolution every fifteen minutes approximately. The grade and yields of carbon are of much the same order as in the channel process, and the process is extensively applied

Revolving Cylinder Type

The cylinder upon which the carbon is deposited has dimensions of about 7·5 in. outside diameter, and 3–8 ft. length. The burners are set lower than in all the other cases considered, and are constructed as to give a cylindrical flame, in contradistinction to the fish-tail flame employed in other types. The cylinder is revolved once per 15–45 minutes, and longitudinally-arranged scrapers remove deposited carbon as the cylinder passes. The scrapers are arranged at or near the top of the cylinder. The usual attention to air and gas regulation is effected, whilst lubrication and general attention to gearing is perhaps most necessary in this type of carbon black plant. The yields are relatively smaller than in other types of plant, but the quality of the black produced is excellent, and allows of profitable running of this type, to a limited degree.

Comparisons

The surface of the deposition plates per pound of carbon black produced, is the least in the channel and small disc installations, slightly greater in the large plate systems, and greatest in the roller or cylinder type. The yield of carbon varies, but is roughly the same in the first three types, being usually much smaller in the case of the cylinder type.

The amount of gas consumed per pound of carbon produced varies to some extent in each individual plant, but in general, lies between 800 and 1,400 c. ft. Improvement is taking place, as for instance, in 1919 there were only two installations obtaining 1·7–2·0 lb. per 1,000 c. ft., whilst in 1920 eight plants accomplished this. Nevertheless, the efficiency of the process, as carried out under the best circumstances to-day, is very low. Less than 5 per cent. of the carbon in the gas is usually returned as gas carbon. It has been claimed that the process justified itself economically as a remunerative price can always be obtained for the carbon, in competition with other forms of carbon. None the less, the question of natural gas wastage must be considered, as supplies are not inexhaustible, and last year as much as 50,000,000,000 c. ft. were used by the industry. The gas is valuable for domestic consumption in many instances, and as a national resource is perhaps better employed for lighting and heating.

The great argument against the carbon black industry and its use of valuable natural gas is the extremely low efficiency of the process of obtaining the black. The quality cannot be approached, as far as is known at present, by any method of thermal decomposition, which will give greater yields of carbon. It seems essential to deposit carbon from a flame containing unburnt carbon. In the application of this basic method, then, it must be admitted that attention to mechanical devices has been marked with success, and the better plants show almost finality in this respect. Chemically, however, the process requires attention and research. If an equivalent grade of carbon could be deposited more quickly, and gas supply speeded up in relation to surface of deposition, it should be possible to conserve the heat, and utilise it in, say, waste heat boilers. At present, the radiation losses from the " buildings " is enormous. Again, the question of adapting the process of thermal decomposition of gas in retorts to the production of a high quality carbon cannot be ruled out.

There is still neglect to extract the petrol contained in natural gas before the latter's usage, in many gas carbon plants. Even before the newer methods of petrol absorption were developed it had been shown profitable to extract petrol occurring even to the small extent of half a pint per thousand cubic feet of gas—and this at a time when petrol was not returning such high prices. The choice of systems of petrol recovery is now so wide—compression, refrigeration, absorption in washing oil or in absorptive charcoal—and the working of the processes so simple and economical, that it behoves every user of natural gas for carbon production to extract petrol first. Ten million gallons of petrol per annum should then be available from gas carbon factories.

Carbon Black by Thermal Decomposition of Methane

Although the value of gas carbon is greater than that of the natural gas from which it is produced at a low efficiency so that this justifies its manufacture especially in those localities removed from large towns whose population may be considered to have a prior right to natural resources, it is quite comprehensible that efforts should have been made and continue to be made, to obtain a greater yield of carbon per unit volume of gas employed. Thus, thermal decomposition of methane at temperatures preferably above 1,200° C.—if reasonably pure hydrogen is desired as a by-product—furnishes as much as 10 lb. of carbon per 1,000 cu. ft. of gas consumed overall. As yet, however, the quality of the carbon is so low as to render it inadmissable in any of the applications to which gas carbon produced as above has been put. It may be well, however, to indicate briefly the processes employed, and the directions in which improvements are being sought. The decomposition of hydrocarbon oil becomes, in its last stage, the decomposition of methane, and the use of either oil or natural gas leads to the same products. Pictet has carefully studied the reactions of decomposition, particularly in connection with hydrogen production. Details in respect of the quantity of heat to be supplied, the heat transmission through retort materials and the surface required for sufficient heat transference, etc., have been worked out, and hydrogen with carbon black can be produced on a large scale. As, however, the production of 1,000 cu. ft. of hydrogen entails the consumption of at least a hundredweight of oil, and as the carbon commands no market, it is clear that the process can have no success in competition with other methods of hydrogen manufacture from water gas by the B.A.S.F. " contact " process, by the cyclic action iron ore—metallic iron (by means of water gas)—iron oxide and hydrogen (by means of steam), or with electrolytic hydrogen—provided electric power is cheap. If a good grade of carbon could be produced, however, in a process akin to that of Pictet, the value of the method would be beyond question.

Similarly, the decomposition of natural gas by passage over heated refractory materials leads to poor grade carbon. The thermal balance has, however, been carefully studied, and improved methods revolve around the production of a finely divided carbon, free from gritty matters, possessing high pigmentary value, and properties rendering its use in the rubber industry possible.

One cubic metre of natural gas yields theoretically ·538 k.G. of carbon, or, otherwise, 1·86 cubic metres are required for the production of 1 k. g. of carbon. In addition, however, from 4 to 4·5 cubic metres of gas are required for heating the cracking retorts to the temperature necessary for decomposition of methane, namely, 1,200° C. Thus, expressed in the units adopted in the previous part of this article, about 12 lb. of carbon are produced ordinarily from 1,000 cu. ft. of methane.

If, however, only approximately 65 per cent. decomposition is attempted, and the residual gas together with the hydrogen formed from the decomposed methane, is passed to the heating burners, much better results are capable of attainment. Moreover, the hot products of combustion in the flues are utilised for pre-heating the air used in the combustion of the fuel gases. The carbon deposited upon the inner surfaces of the decomposition retorts is continuously removed by scrapers, so that heat transference is not diminished. By continuous working and attention to heat exchange and the general thermal balance of the process—the extent of decomposition being altered from the illustrative figure of 65 per cent. (above) if required—one kilogram of carbon can be produced from three cubic metres of methane—an over all figure. That is, a yield of about 25 lb. of carbon per 1,000 cu. ft. of gas can be realised. This figure stands in strong contrast to the maximum realisable by methods described in the earlier sections of this article—2 lb. per 1,000 cu. ft. gas consumed.

No success has yet attended the efforts to produce a similar grade of carbon to that obtained, say, in the channel process of gas carbon manufacture, but the prospects awaiting even an approach to this grade by application of thermal decomposition methods of the above type is so alluring that efforts are being made with this aim in view.

Carbon Removal from Waste Paper

In times of economic necessity, waste printed matter may profitably be treated for recovery of the paper, the pulp being re-used after the ink has been removed. A brief indication of such processes may be made in closing.

The waste paper is treated with caustic soda solution in definite strength—a strong solution is to be avoided as the fibre becomes yellow in this case. On boiling the mass, the oil and binding materials in the printing ink upon the paper are dissolved or emulsified, and the carbon is loosened from the paper pulp. The separation of the carbon is much facilitated by the addition of fullers earth to the mix, since the semi colloidal earth absorbs the finely divided carbon, and the subsequent separation of the carbon, fullers earth complex from the pulp is easy, and after washing, a good clean paper pulp is left, suitable for re-use in paper manufacture.

Such a process, developed during the late war, proved of great use, in those times when paper pulp was abnormally dear.

Abandonment of Norwegian Carbide Plant

It is reported that the Electric Furnace Products Co., Ltd., which has built a modern and thoroughly equipped carbide plant at Sande, Norway, seems to have definitely abandoned plans for operation. The company was organised in 1909, and financed by Canadian capital. Much money was spent in construction work, but the plant was not brought to production point until after the demand for carbide had dropped. Since 1920, all work has been abandoned. The managing director of the plant has been in America for a year. He was expected back this autumn but now it is stated that he will not return before spring. It is stated that Norwegian carbide factories are not able to compete with Swiss factories. The best foreign market is said to be Australia, and to encourage the local industry, the import duty has been fixed at a figure that is practically prohibitive.

Chemical Research in America

Professor Donnan's Impressions

Professor F. G. Donnan, of University College, London, who has lately returned from a visit to America, gave a representative of The Chemical Age this week some impressions of his visit. It will be remembered that Professor Donnan with Sir J. J. Thomson and Principal Irvine, of St. Andrews, were the British delegates at the recent spring meeting of the American Chemical Society, and at the opening of the new chemical laboratories at Yale University.

It was difficult, said Professor Donnan, to give a fair impression from such a short visit, especially when one was shown so much in the time. "I was most impressed, however," he said, "by the air of optimism and enthusiasm which seemed to underlie the proceedings at which I was present. "It is very easy, of course, to praise up a country from a short visit, but there is no doubt that research there is conceived on a large scale, and on a broad basis of co-operation between the universities and manufacturers. Of course there may be a danger in too many conferences and in too much talk, but the American likes these things better than we do."

Large Scale Co-ordination

The National Research Council in co-ordinating scientific research of all kinds was doing a work which could not be compared with anything here, he said, except perhaps the Department of Scientific and Industrial Research, which was on a very much smaller scale however. The American Chemical Society too, was a comprehensive body with numerous sections, petroleum section, organic section, cellulose section and so on, and took the place of several organisations here. It had a membership of twelve to fifteen thousand and had grown from about 3,000 before the war. There were two meetings a year, and at the spring meeting there were 1,200 chemists, which for a population about twice ours was not bad, said Professor Donnan. "There is no doubt," he continued, "that the American Chemical Society has a big effect on the industry."

Industrial Research

Owing to the brevity of his visit, Professor Donnan did not visit any chemical works, but from inquiries he made it was clear that the big firms such as the Du Pont, Kodak and Western Electric Companies had a very broad view of the value of research and had research staffs of their own who were allowed considerable freedom in their research and in giving it publicity. This was apart from the officially-encouraged research by the Government departments such as the Bureau of Mines. The general organisation of research was on similar lines to ours, but there was more co-ordination between the pure and applied branches. Several professors were consultants to manufacturing firms.

"One cannot help feeling" he said, "that if the centre of gravity of chemical research is to move at all, it will move towards America. One reason of course for the present prevailing enthusiasm may be the fact that there is at present a great internal trade boom, a shortage of labour all round, and so on, a state of affairs quite different from that of twelve months ago. The total amount of export business, in the general trade of the country (not particularly the chemical trade) appears to be only about 3 per cent. of the whole however. This figure was given by one or two commercial men."

The Dyestuffs Industry

The position in the newly-created dye industry seemed parallel to ours, the editor of *Industrial and Engineering Chemistry* having said that before the war 85 per cent. of the dyes used were imported, but that now 85 per cent. were made in the States. Professor Donnan was greatly impressed by the hospitality shown to the delegates, all the arrangements being carried out in a way which we do not approach here. All meals were arranged and rooms taken in clubs (not hotels) beforehand by Dr. Charles Parsons of the American Chemical Society. Their ideas of hospitality were very lavish, and one met numbers of people at dinners, lectures and so on. "On one occasion," he said, "I was introduced to nearly a thousand people and shook hands with them all."

Nitrates from the Air

To the Editor of THE CHEMICAL AGE.

SIR,—At the conclusion of my last Cantor lecture on "Nitrates from the Air," Dr. Harker made some remarks about certain explosions in plants of the Nitrum Company. I referred the matter to the company, and enclose their reply, which I should be glad if you would publish.

As you will see, there were two explosions, and they had nothing to do with the working of the Arc process, for they were due to a leakage in the apparatus for freezing out the NO_2 in conjunction with toluol or benzene. Such accidents might happen to any process giving nitrogen dioxide.

As a matter of fact, the method which the Nitrum Company had written me about, and which I had in mind in my lecture, is an *aqueous* absorption plant, and it is absolutely safe. Dr. Harker's criticism is of the same order as those criticisms of gas fanatics who used to condemn all electric lighting because the fusing of an electric light wire once started a fire; or, again, the argument of compressed air advocates against the use of electric coal cutters because a man once got his leg in a cutter wheel.

It is the special *forte* of electricity to go sailing serenely along in every industry in which it once gets a foothold, and it confounds its critics at every turn, but it is tragic as well as somewhat amusing to see how people will keep clutching at straws in their efforts to stem the electrical tide. Those who feel they must criticise should "go for" the heads of the powerful trust organisations who do not want any process of making nitrates from air to succeed. In the future, when the true inner history of the war comes to be analysed by one who has the scientific engineering outlook, an outstanding fact will be the way in which this country was held in the grip of the natural nitrate octopus.—Yours, etc.,

E. KILBURN SCOTT.

38, Claremont Square, N.1.
May 14, 1923.

[COPY.]

Zurich, May 9, 1923.

DEAR SIR,—In answer to your letter of April 26, we have to state that the explosions at Zschornewitz and Bodio had really nothing to do with the working of the arc process. In the description we sent you on March 12 the nitrogen oxides of the furnace are absorbed in a specially designed aqueous absorption plant, and there is therefore no danger of any explosion whatever.

The explosions which took place in the plants of Zschornewitz and Bodio happened in a part of the system which has been abandoned. The furnace gases were cooled to a very low temperature of about 70° C. below freezing point, thus freezing out the NO_2 (nitrogen dioxide) contained in the gas current. To transmit the cold at low temperature we used toluol or benzene, and through a leakage in the cooling apparatus the organic cooling liquid mixed with the NO_2 and took fire. As this part of the scheme has been definitely abandoned, there is now no danger.

Our Rhina plant is using our patented aqueous absorption, the yield measured at the furnace being about 75–80 grains of nitric acid (100 per cent.) per kW hour and the air to the furnace consisting of about 50 per cent. oxygen and 50 per cent. nitrogen.

(Signed) SOCIETE ANONYME NITRUM.

What is a Chemist?

To the Editor of THE CHEMICAL AGE.

SIR,—I apologise for reopening this important matter upon which you so kindly lent space in your valued journal, for educating the non-enlightened industrial undertakings as to what a chemist is, and his proper place and position in the factory, independent of the laboratory. The following advertisement only goes to show the attitude of some employers:

> "Wanted Analytical Chemist; must be well up in oil, varnishes, etc., etc., to act as works foreman and Chemist.—Apply, stating particulars . . ."

Whilst there are scores of experienced and qualified university men wanting employment on a par with their professional status, I hope that such advertisement will not be replied to by those who have the interests of the chemist at heart, and on whose behalf the Presidents of the Institute of Chemistry and Society of Chemical Industry are respectively endeavouring to enlighten the general public, and would-be employers in particular.—Yours, etc.,

CHEMIST.

Industrial Welfare Society

To the Editor of THE CHEMICAL AGE.

SIR,—At the request of many of its member firms, the Industrial Welfare Society has approached the British Broadcasting Company, Limited, with a view to securing a change of time in the transmission of the mid-day concert, in order that industrial workers may have the opportunity of "listening-in" during their normal dinner hour. We understand that this proposal will receive favourable consideration if evidence of a fairly general desire on the part of commercial and industrial firms to avail themselves of these facilities is produced. Hundreds of thousands of workers take their mid-day meals in canteens and mess-rooms provided by their employers, and we have evidence that many firms are willing to install receiving apparatus if the times of the mid-day transmission are re-arranged. We shall be glad if other firms interested in this matter will communicate with the Industrial Welfare Society, 51, Palace Street, Westminster, S.W.1.—Yours, etc.

GERALD L. PERRY, Secretary.

British Association of Chemists

A Survey of Six Months

IN the April Bulletin of the Association it is stated that the six months which have elapsed since the appearance of the annual report of the Council have witnessed a slight improvement in the industrial situation and in trade generally. This improvement has, however, not yet been reflected in the unemployment among chemists, the percentage of members of the Association actually unemployed having risen from a little over 3 to 7 per cent., but there is reason to believe that the worst is past and that unemployment among chemists is now on the decline. The Unemployment Benefit Fund which was inaugurated in July of last year has now come into operation. A sum of £1,100 has been paid into the Fund, from which two members are at present drawing benefit. The number of members subscribing to the fund is 618, and the average number of units subscribed for is 2·13. The work of the Legal Aid Fund has continued quietly but effectively during the past few months.

The negotiations with the National Union of Scientific Workers have proceeded, and two further joint Council meetings, over which Mr. C. S. Garland, M.P., has presided, have been held in London. The various possibilities of joint activities are being thoroughly explored by joint committees, and it is hoped that definite schemes for the issue of a joint journal and the conduct of joint activities will come into operation in the near future.

The Parliamentary and Whitley Councils Committee was instrumental in placing before a number of candidates in the last general election a questionnaire relative to the interests of chemists, and twenty-one of the successful candidates signified their entire support of the Association's programme. Among the successful candidates was one of our own members, Mr. C. S. Garland, who has given generously of his time in watching the interest of chemists at Westminster and elsewhere. The Pharmacy Acts Amendment Bill, which was introduced by Captain O'Grady in the previous Parliament and aims at restricting the use of the title "Chemist," has been introduced again during the present session, and its progress is being watched by the Parliamentary Committee and the Legal Re-definition Committee. These committees will lose no opportunity of pressing for the legal re-definition of the term "Chemist," and of promoting co-operation among the various organisations concerned towards that end.

With great regret the Council have accepted the resignation of Mr. S. R. Price, as hon. general secretary of the Association, and at the last Council meeting, Mr. I. Boodson was appointed to fill the vacancy until the next annual general meeting. A scheme of extensive propaganda work has recently been approved by the Council, and will shortly be put into operation.

The Baeyer Memorial Lecture

Review of the Work of a Great Organic Chemist

DR. W. H. PERKIN delivered the Baeyer Memorial Lecture before the Chemical Society on Thursday, May 10. Dr. W. P. Wynne, President of the Society, was in the chair.

In opening, Dr. Perkin said that the survey of the present position of organic chemistry could not fail to leave the impression that a definite period in development of the science had closed with the decease of Adolph von Baeyer and of Emil Fischer. While passing in review the wonderful achievements of Baeyer and attempting to follow the sequence of his brilliant researches, it was useful to remember the conditions which prevailed during the time that his career as a teacher and investigator was developing. He was born in 1835, shortly after the publication of the synthesis of urea by Wohler, the discovery of aniline and phenol in coal tar by Runge, and the preparation of benzene from benzoic acid and its nitration by Mitscherlich. While he was still a boy, Liebig and Wohler published their famous paper on benzoyl, which led to the enunciation of the radical theory, and the completion of his thesis for the degree of Doctor " Ueber die Verbindungen des Arsens mit dem Methyle " coincided almost exactly with the publication of Kekulé's great work on carbon. Baeyer's first papers appeared in 1857, while he was working in Heidelberg in Bunsen's laboratory, and his last paper, published when he was 80 years of age, was to be found in the *Annalen* of 1915. His first chemical experiments were made at a very early age and seem to have caused not a little inconvenience to his family and the visitors to the house.

Early Days

In 1847, when he was 12 years of age, he made his first new substance, a crystalline double salt of copper and sodium carbonate, which he obtained accidentally by mixing copper sulphate with sodium carbonate and allowing the solution to stand for some days. The more serious study of the science, however, seemed to have begun when Baeyer was about 13 years of age, and after the usual period of military service Baeyer came definitely to the conclusion that chemistry was to be the work of his life. He proceeded to Heidelberg and studied under Bunsen, where he came into contact with Roscoe, Lothar Meyer, Lieben and Beilstein, who were working in Bunsen's laboratory at the time. There he carried out a research on methyl chloride, at the suggestion of Bunsen, who was desirous of finding out whether methyl chloride prepared by the chlorination of methane was the same substance as was obtained when hydrochloric acid acted on methyl alcohol, and if so, whether it was identical with the chlormethyl which resulted from the action of heat on the hydrochloride of cacodylic acid. Baeyer at that time was unable to prove the identity which, as a matter of fact, was supplied two years later by Berthelot. Later Baeyer went to work with Kekulé, in Heidelberg, for two years, and continued his researches upon cacodyl trichloride, during the course of which he accidentally discovered arsenic methyl chloride.

In 1858 Baeyer returned to Berlin and presented this research as his thesis for the degree of doctor. The thesis was coldly received and resulted in a second class, which Baeyer said was as much as he expected. In the spring of 1860 Baeyer became privatdozent at Berlin and shortly afterwards received the appointment of teacher of organic chemistry in the Gewerbeinstitut in the Klosterstrasse, a modest and badly paid post which he held for 12 years. In this institute he organised a laboratory for practical work and gradually collected together a number of keen and zealous workers, among whom were Graebe, Liebermann and Victor Meyer. There could be no doubt, said Dr. Perkin, that it was in this unpretending laboratory in the Klosterstrasse that Baeyer gradually acquired that keen penetration and marvellous skill in experimenting which subsequently made him famous. During these years Baeyer continued his researches on uric acid and its derivatives, and gradually brought order out of the chaos which had reigned for so long in this difficult and puzzling group. As a result of this work, Baeyer turned his attention to the problems of physiological chemistry, and among other things, he put forward a formula for grape sugar which was identical with that employed at the present day. It was there that the phthaleins were discovered. This led to the discovery of many valuable dyestuffs, such as gallein, the condensation product of phthalic anhydride and pyrogallic acid, and of coerulein, the green anthracene dyestuff obtained by heating gallein with sulphuric acid. Other members of the group were fluorescein, eosine and the rhodamines, which are among the most beautiful of all the artificial colouring matters, and for this reason they soon became, and still are, of immense technical importance.

In 1872, Baeyer accepted the professorship of chemistry and directorship of the new laboratories at Strassburg University, where laboratories were then about to be built. During the time Baeyer was at Strassburg, however, very little new work was done owing to the time being occupied in organising the new laboratories, and during the early months of 1875 he was invited to the Chair of Chemistry in Munich which, after some hesitation, he accepted, on the advice of his friends. Owing to Liebig's lack of interest in experimental investigation, Baeyer found that there was no chemical laboratory, and consequently no students of chemistry at Munich. It was evidence of the largeness of view which Baeyer took of the situation, that the laboratories he designed are still admirably suited to their purpose, and are, indeed, so well designed in all their details that they long served as a model for the other laboratories which gradually sprang up in all the principal university towns in Germany. In organising the courses of instruction in practical chemistry, the inorganic section was placed in the hands of Jakob Volhard, and his first successor in the line of famous chemists who taught inorganic chemistry in Munich was Emil Fischer. The teaching of organic chemistry seemed from the beginning to have been entirely in Baeyer's own hands, but he also delivered the elementary lectures in inorganic chemistry, and continued to do so up to the year of his resignation in 1915.

Synthesis of Indigo

In 1870 Baeyer achieved the first synthesis of indigo which, as is well known, was the result of heating isatin chloride with phosphorous and hydriodic acid. It was remarkable, and unlike Baeyer, that this extraordinarily interesting result was not followed up immediately, but this was due to the fact that the work was put aside out of consideration for Kekulé, and nothing more was done with the indigo problem for eight years. It was, therefore, in 1878, after coming to Munich, and finding that nothing further had come of Kekulé's work on the subject, that Baeyer again took it up, and between 1878 and 1884 those classical researches on indigo and its derivatives appeared which would always be intimately associated with the name of Baeyer. The next subject which now occupied his attention was an investigation in the polyacetylene group, and it was Dr. W. H. Perkin's good fortune to be allowed to take part in and watch these experiments, which Baeyer carried out with no other apparatus than test tubes and glass rods.

Classical Researches

Between the years 1884-1893 Baeyer published a mass of work of a very varied kind, including the synthesis of hydrindenecarboxylic acid, tetrahydronaphthalenedicarboxylic acid and naphthalene, a discussion of the synthesis of aceto-acetic ester, the important synthesis of phloroglucine by the action of heat on the sodium derivative of malonic ester. These researches gave rise to the well-known series of investigations on the properties of succinylsuccinic ester, and another outcome was the discovery of a simple method for the preparation of p-diketohexamethylene and of its conversion into p-dihydroxyhexamethylene (chinitol) and then into di-tetra- and hexahydrobenzene. It was during the course of this investigation that Baeyer first put forward the important generalisation that the distinctive aromatic character of benzene and its derivatives is entirely destroyed when the nucleus is reduced and that substances like di- tetra and hexa-hydrobenzene have no longer aromatic character but are essentially similar in properties to substances belonging to the aliphatic series. Then followed a systematic investigation of the reduction of benzene derivatives and especially the

study of the reduction of the phthalic acids, followed later by a long and brilliant series of investigations on the terpenes. It was interesting, said Dr. Perkin, in reading these papers, to endeavour to follow the line of thought which led from the first simple results to so many important developments in such a variety of directions. These experiments caused Baeyer to turn attention to the properties of oxygen in general and particularly to the question of whether oxygen can or cannot function as a tetravalent element, and in connection with these researches on oxygen Baeyer became much interested in the basic properties of carbon. Baeyer continued right to the end to interest himself in the oxonium salts of the pyrone type and his last research, published in 1915, when he was 80 years of age, had for its subject the reduction of the pyrones. This communication contained the first description of the oxonium colouring matters, substances of great interest particularly because of the probability that they are allied to colouring matters which Wilstätter had isolated from the blood and from plants; and this brilliant piece of theoretical and experimental work showed that Baeyer retained to the last his great powers as a thinker and investigator. It was highly probable that he would still have continued his researches but for the fact that, when all his assistants had been called away to the war, he felt unable to carry on alone.

Personal Characteristics

In attempting to pass in review the life and career of a great personality such as Baeyer unquestionably was, the mere discussion of his published researches could at the best give only a very inadequate impression of the real character of the man. And yet, on account of his retiring nature and dislike for publicity, the actual man was known to comparatively few, and it was not easy to convey a clear impression of the personal traits which were his characteristics. Probably the most characteristic feature in Baeyer's character was the steadfastness of purpose and determination to allow nothing to interfere with his duties as a teacher or with the course and development of his investigations. He made it quite clear to the University authorities that he would have nothing to do with general University politics, and he always refused to serve on committees or attend meetings unless they were directly concerned with the affairs of his department. He would have been horrified at the waste of time and energy, due to attendance at committee and other meetings, which would seem to be an essential part of the routine of heads of chemical departments in this country. There could be no doubt that it was this refusal to waste time, coupled with his extraordinary power of concentration, which made it possible for Baeyer to produce, with such regularity, so great an amount of work always full of originality and of first rate importance. Another reason for the enormous output of original work is to be found in the fact that he regulated his whole life so that nothing should stand in the way of the development of his researches.

One rather unexpected feature of Baeyer's character was the pleasure he took in the ordinary routine of lecturing, and he used to say that he felt the day had not been really a satisfactory one if he had not given his usual lecture in the morning. As a lecturer, Baeyer was most interesting and clear, the impression conveyed being that he was considering the subject from new points of view while he was actually delivering the lecture. It was unfortunate that Baeyer seldom lectured on any but the most elementary matters, and rarely indeed gave to his students or colleagues any account of his own investigations or of the lines on which he proposed to proceed in the development of the researches he had in hand.

Methods of Work

It must be emphasised that Baeyer was a great reader, especially of current literature, and had a remarkably wide and thorough knowledge of the literature of the subjects he was interested in. His private laboratory, in which Dr. Perkin worked for a year, was equipped with the simplest possible apparatus, the most striking feature being large racks, such as are commonly in use at the present time, filled with test-tubes. He insisted always on absolute cleanliness, and it used to be said that his test-tubes were first soaked in dilute caustic soda for an hour, then washed with water, then with alcohol, and finally with distilled water, and dried. Baeyer also used large numbers of carefully cleaned glass rods, and had always a stock of these to hand, but the striking feature of the laboratory was the absence of any large apparatus as well as of mechanical devices of any kind.

Baeyer used to say that the only way to tackle a problem was to keep on experimenting until it was solved, and Wilstätter relates that, on one occasion, a colleague from another university, while congratulating Baeyer on a great piece of work he had just finished, remarked that he only wished such luck would come his way. To which Baeyer replied, "It is not a matter of luck, I have no more luck than you have. The only difference between us is that I experiment more than you do." The attitude of Baeyer towards experimenting may be expressed in his own words: "I do not make the experiment in order to see whether my views are or are not correct, but in order to find out what the behaviour of the substance is under a variety of conditions. It is for this reason that I attach little importance to theories." The one side of theoretical organic chemistry, however, which interested him more than any other, was the structural aspect, and the study of the introductions to his papers showed how remarkably accurate were his notions of structure, even in early times. It was doubtless this interest in structural formulae which lead to the enunciation of the "Bond Theory," and to his views on the structure of benzene. It was the example Baeyer himself set which was the driving force and the mainspring of the great reputation which the Munich School enjoyed and still enjoys under his distinguished successor. It was only necessary that the commanding figure of Baeyer should stroll through the research laboratories each day and for him to chat with the various workers and criticise their results and admire their preparations, to make it out of the question for anyone to forget for a moment that research was the only thing that really mattered. It is impossible not to be struck by the fact that this same attitude has, since the war, become increasingly evident in the laboratories in our own country, and that research has now come to be looked upon as a most important, if not the most important, part of the training and education of every chemist.

Poison Gas as a Cure for Disease

An American Discovery

To cure rather than to kill is the most modern use of the so-called poison gases. Experts of the United States Chemical Warfare Service believe that the possibility of successfully treating influenza, tuberculosis, paresis, and other afflictions by the use of poison gases has been demonstrated by experiments now being conducted at Edgewood Arsenal, in the U.S.A.

It is asserted that through experiments with chlorine gas, the chemists have established the fact that epidemics of influenza and colds may be checked almost instantly by the introduction of weak concentrations of the gas into the rooms occupied by those exposed.

That mustard gas is a specific for tuberculosis apparently seems to be demonstrated by the experiments conducted under the direction of Lieutenant-Colonel E. B. Vedder, of the Army Medical Corps. Guinea pigs inoculated with tuberculosis germs and a concentration of mustard gas were apparently rendered immune by the gas and failed to contract the disease. An equal number of guinea pigs inoculated with tuberculosis germs and not subjected to the mustard gas treatment contracted the disease.

As a result of experiments with lewisite, the chemists have evolved what appears to be a remedy, if not a cure, for paresis and locomotor ataxia.

Dr. A. S. Loevenhart of the University of Wisconsin has been studying the effects of lewisite upon the human system in conjunction with the chemists at Edgewood Arsenal. He has the records of forty-two persons committed to insane hospitals with paresis, who have come under this treatment. Of that number, twenty-one have been cured.

The fact that chlorine might be used to prevent or cure c lds influenza and pneumonia was demonstrated during the war at Edgewood Arsenal by accident. It was remarked that cases of influenza or pneumonia did not occur among the workers in the laboratory where chlorine was being made although 10 to 20 per cent. of others on duty at the arsenal were victims. Investigation showed that in the rooms where chlorine gas was being made there was a slight leakage of chlorine, just enough to act as germicidal agent.

Tully Gas Developments

A Process for the Removal of CO

On Friday, May 11, a large party visited the Bedford gas-works, at the invitation of Mr. C. B. Tully, chairman of Tully Gas Plants, Ltd., to inspect the complete gasification plant installed by the company at the works and to hear some account of Mr. Tully's process for the removal of carbon monoxide from town's gas. The installation consists of two units, each with a capacity of 750,000 cubic feet of gas per 24 hours. It was stated that in the year before the plant was put into operation the Bedford Gas Company carbonised 24,000 tons of coal, whereas this year the quantity will be about 15,000 tons, with an increase of about 7 per cent. in the gas sold, a saving of 9,000 tons of coal thus being effected.

A Successful Experiment

After the visitors had inspected the plant, Mr. Tully briefly explained his method of eliminating carbon monoxide from gas, and at a luncheon further reference was made in speeches to the CO removal process and to further prospective developments. Sir Harry Brittain welcomed the guests and spoke of the importance of encouraging research and experiment and of assisting to turn scientific discoveries to commercial uses. The Rev. H. P. Wyatt, chairman of the Bedford Gas Company, expressed the satisfaction of himself and his fellow directors with the result of the Tully installation, and stated that the experiment had been completely justified. Lord Waring also spoke of the efforts of Mr. Tully to advance the interests of the gas industry, and emphasized the need of supporting any efforts after scientific and commercial progress.

Gas for Industry

In replying to these speeches Mr. C. B. TULLY said that that gathering commemorated the satisfactory completion of a new and forward step in the scientific gasification of coal. Nearly 200 Tully plants had been established throughout the British Isles and abroad.

With the help of friends they had accomplished work in four years that would otherwise have taken a quarter of a century. Over a quarter of a million pounds had been spent in hard cash and so great was their faith in ultimate success that they decided to put back into their work the profits made. His remarks might offend or please the gas industry, but his opinion was that the industry, as known to-day, was of secondary importance to the development of gas for industrial purposes. It was not coming; it was here, awaiting the young gas engineer. Tully Gas Plants, Ltd., had inquiries for industrial work from all quarters of the world, and they were putting up some very large installations. The inquiries were in all cases for gas of about 350 B.Th.U. If the gas industry would not take the hint, they would lose all their large customers and consumers as they did the large gas engine users. They would have to make some drastic change in their method of charges.

The Carbon Monoxide Problem

The important future of his business lay in the development of the production of gas for industry. They were launching various developments of the greatest importance to the gas industry and to industry generally. During the past few years many propositions had been put up for gases of varying composition, such as gas rich in hydrogen, gas free from methane and hydrocarbons, and gas low in hydrogen. These propositions led into the development of physical chemistry and a study of the reactions and phenomena of gases. The result had been that gases could be produced of practically any composition within reason.

The reduction of carbon monoxide in gas of any kind was the first and most simple catalytic reaction they had dealt with. The carbon monoxide in the presence of steam, at a temperature of 400° to 600° C., according to the catalyst used, was converted into carbon dioxide and hydrogen. One volume of hydrogen was obtained for every volume of carbon monoxide converted into carbon dioxide. The carbon dioxide could be removed by absorption by water, diffusion, or compression and liquefaction; or partially by these and finally by lime. The cost of the removal, or rather the substitution of hydrogen for carbon monoxide, depended upon the cost of the removal of the carbon dioxide, and the heat required to support the thermic catalytic reaction taking place, which would probably be under one penny per thousand cubic feet of gas, and the degree to which the carbon monoxide was to be reduced.

Sulphur-free Gas

The gas industry, Mr. Tully continued, has been familiar with the catalyst treatment of gas in the shape of Dr. Carpenter and Mr. Evans's heat purification of gas process, carried on by the South Metropolitan Gas Company at all their stations and treating the whole of their gas sent out. Practically the same plant is necessary for the removal of carbon monoxide, and I hope to have the benefit of Dr. Carpenter's experience in this direction. Dr. Carpenter, to my mind, made a great step for the welfare of the industry when he put forward his scheme, but unfortunately it did not find many supporters. However, I think no one will dispute the importance of the supply of a sulphur-free gas. With the simple process we now have of reducing this compound, I see no reason why it should not be reduced to reasonable limits.

Production of Methane

Having solved the proposition of obtaining a gas with an excess of hydrogen, the next step is to convert this excess, with carbon monoxide, to produce methane. In this way we get a gas of a mixture of methane and hydrogen. Gas with an excess of hydrogen is the starting point of all synthetic processes.

Mr. Tully added that the Tully plants already erected represent a money value of over £400,000. They were now dealing with inquiries and orders and repeat orders to the value of £1,600,000 in respect of some 346 plants. Most of these inquiries had reached the stage where drawings and specifications had been completed. Some of these orders and many of the inquiries were for the combined Tully and low temperature plant. One of these was approaching completion at Horncastle, and he saw no reason why most of the gasworks, which had already installed the Tully plant, should not eventually adopt the dual system.

Low Temperature Process

Another important development was the combination of the Tully plant with the low temperature process. The idea was to gas-fire the low temperature retorts by means of Tully gas of 350 B.Th.U. to dilute the rich low temperature gas to the required B.Th.U. The advantages of this system were many. In the first place the capital construction cost and wear and tear were less. There was no stoking or clinkering; the heats are under constant and absolute control. The operator made the gas for heating and setting at no extra cost for labour. The plant would produce low temperature fuel or ordinary gas coke at will and had a long range of flexibility. They were taking an important step forward, and in these days of international competition they could not neglect one single item that would increase speed and efficiency. The preservation of national resources, the utilisation of every ounce of wealth, the elimination of every wealth-leakage and wasteful method was essential to us as a nation if we were to preserve our place in the world-race. We should have a ready ear and receptive mind for every practical suggestion for making ourselves independent of foreign supply of those commodities which we could produce for ourselves.

World-wide Public Utility

Captain SANDFORD, in some further remarks, said that the consumption of gas in this country was only a fraction of what it should be and could be within the next few years. The application of gas for heating, lighting, and cooking was one of the best things that the engineer has done. The results of Mr. Tully's investigations into the elimination of carbon monoxide from household gas was likely to have far-reaching results, and would increase the popularity of gas, especially as the process appeared to be simple and cheap. Their plant had other important spheres as well as the gas industry, such as the distillation of shale, the production of hydrogen for the manufacture of synthetic ammonia and other purposes. There were plants going up in various parts of the world for various purposes, and in the short space of four years or so they had established a worldwide business of public utility.

A Note by Messrs. West and Jaques

In a letter on Mr. Tully's process for removing carbon monoxide Mr. J. H. West and Dr. A. Jaques (who have been associated with Mr. Tully in several patents) state :—

"In April, 1922, an agreement was entered into between Messrs. Suzuki & Co., of 29, Mincing Lane, E.C., Messrs. Tully Gas Plants, Ltd., of Newark, and ourselves, to develop an invention of ours for the production from coal of gases rich in hydrogen, chiefly with a view to the manufacture of synthetic ammonia; the two firms sharing the expense. One stage of our process involves the well-known conversion of carbon monoxide and steam into carbon dioxide and hydrogen by means of a catalyst, and arrangements were made for us to work out our process at Messrs. Tully's works at Newark.

"After a few months' work we evolved a very satisfactory catalyst, and succeeded in reducing the carbon monoxide in Newark town gas to 2 per cent. on the laboratory scale. Large scale experiments were then begun, and these are not yet completed.

"Under the agreement referred to above, in exchange for the right to use Mr. Tully's patented gasification plant for our hydrogen process, we have granted to Messrs. Tully Gas Plants, Ltd., the right to use our invention when applied to town gas, and we therefore informed Mr. Tully of our results, and pointed out to him their bearing on the removal of carbon monoxide from town gas some nine months ago.

'In the experiments made by Mr. Tully on a scale of about 200 c. ft. of gas per hour the catalyst was made according to our formula, but prepared in pieces of a different form, which offer less resistance to the passage of the gas through it. The catalyst prepared in this way, being much less active than our form, is not so suitable for our purpose, though it may be quite satisfactory for the treatment of town gas."

The Properties of "Ciment Fondu"

A Cement with Novel Characteristics

In a paper before the Institution of Engineering Inspection in London, on Friday, May 11, Mr. H. J. Davey, M.B.E., dealt with Ciment Fondu—a cement of high initial resistance produced in France—and gave results of chemical analyses. It was claimed by the producers that Ciment Fondu, although it met the British standard specification physical requirements for slow-setting cement, matured so rapidly after setting that, at the age of 24 hours after gauging, its resistance to load equalled that of normal Portland cement at one month. It was further asserted that Ciment Fondu was indecomposable by the action of sea water and by sulphur-impregnated water or earth. The discovery of Ciment Fondu was the result of long and patient research. In the course of research in 1897—the earliest date known to be associated with experiments leading to the discovery—an artificial puzzolana was obtained by fusion of materials in a water-jacket furnace. In 1906 further research was undertaken for the production of an indecomposable cement of high alumina content, the research being based on the fact that, in a cement of high hydraulicity index, lime would not be thrown out at the first indication of setting. Consequently, the sulpho-aluminate, a contributory cause of the decomposition of artificial cements, could not be formed. In the course of this research, Ciment Fondu was obtained, and the process was protected in France in 1908. The production of an indecomposable cement proved the theory which prompted the research, but the extraordinary property of rapid maturity was not foreseen.

About eighteen months ago Mr. Davey received a small sample of Ciment Fondu, and he carried out tests under conditions identical with those observed for the routine testing of Portland cement, with the exception that the briquettes, after setting, were taken from the moulds and immersed in water eighteen hours after gauging (it was customary to leave briquettes in moulds 24 hours). The small amount of Ciment Fondu received restricted the number of briquettes to six neat and six mortar (one Ciment Fondu to three standard sand by weight), and these were divided between two ages for testing, viz., one day and seven days. The tests resulted in the entirely unexpected verification of the claims made. Concrete made with the cement gave figures for tensile stress which, in relation to all known tests of concrete, could only be described as phenomenal. One cube was crushed at the age of 90 days, breaking at a load of 330,300 lb., or 147·4 tons, equivalent to 9,100 lbs. per sq. in., or 582·2 tons per sq. ft. From records of Portland cement concrete at 90 days, a load of 5,000 lb. per sq. in. at that age represented exceptionally good concrete.

Chemical Composition

The chemical aspect was dealt with in a paper by Mr. H. F. Knight, who gave the analysis of Ciment Fondu as follows :—

	Per cent.
Insoluble	0·92
Silica, SiO_2	9·76
Alumina, Al_2O_3	44·32
Ferrous Oxide, FeO	0·47
Metallic Iron, Fe	3·43
Lime, CaO	40·26
Magnesia, MgO	0·57
Sulphuric Anhydride SO_3	trace
Phosphoric Anhydride, P_2O_5	trace
Sulphur (as Sulphide)	0·11
Alkalis, Loss, etc.	0·16
	100·00
Specific Gravity	3·049
Lime ratio, or Hydraulic modulus $\frac{CaO}{SiO_2+Al_2O_3}$	= 1·21

After perusing the results of mechanical and chemical tests, the author stated that the material did not comply with the British Standard Specification. There were other considerations, but, as Ciment Fondu was obviously not a Portland cement, it could not be expected to comply with any specification but one specially drafted to deal with cement of this class. As to the constitution of Ciment Fondu, a very high temperature would be necessary to cause fusion to take place between such highly refractory substances devoid of any fluxing material, and a temperature between 1,500° and 1,800° C. was sure to be required; the resultant clinker must be extremely hard. Such high temperatures were most readily obtained by means of some form of electric furnace, and such would be likely to produce a reducing atmosphere and thus account for the iron being in the ferrous condition. The presence of metallic iron could be accounted for in two ways: (1) Actual addition during the final grinding, or (2) attrition of the steel balls and mill used in grinding the very hard clinker. The latter was the more tenable hypothesis. Analysis of a cement such as Ciment Fondu required considerable skill and patience, but once the direction in which special care was required was known, any capable analyst accustomed to mineral work should have no difficulty in tackling the problem successfully. There was no doubt, he thought, providing later tests established the stability of Ciment Fondu concrete, the material had a great future before it, despite the necessarily high price. The use of it on roads would enable them to withstand modern traffic, and traffic should be carried within three days of repair, thus avoiding the longer wait necessary for the maturing of concrete made with Portland cement.

It was also claimed that Ciment Fondu, alone of all cements, resisted the attack of sea water and other sulphur impregnated waters, due to the high hydraulicity index, which opposed the formation of sulpho-aluminate. Concrete blocks have been used in the open air in France and continuously laved by a spring of water containing sulphuric anhydride and magnesia, for some years, without trace of decomposition, and resistance to attack by sea water was now being determined by actual immersion.

The method of gauging Ciment Fondu was analogous to that of ordinary artificial cements, but it was desirable to have the mixture quite wet before punning into position. Precautions must be taken against admixture of Portland cement or any other binding material, even in the smallest proportion with Ciment Fondu. A note of warning was sounded relating to the heat generated on the setting of neat Ciment Fondu. If used neat in large masses the heat evolved on setting might ignite any easily combustible material in contact, but with Ciment Fondu concrete or mortar the elevation of temperature was negligible.

A discussion followed the papers, in the course of which it was stated that the cost of Ciment Fondu was about £9 per ton.

Oil and Colour Chemists

Annual Meeting and Dinner

THE annual meeting and dinner of the Oil and Colour Chemists' Association was held at the Holborn Restaurant, London, on Wednesday, Dr. Newton Friend (president) in the chair.

At the annual meeting it was announced that the membership has fallen from 196 to 183 during the year owing to resignations and members struck off through non-payment of subscriptions. The financial statement for the year showed a deficit of £48, and it was estimated that there would be a small loss on the current year's working. As regards the proposed Institute of Paint and Varnish Technologists, it was reported that a scheme had not yet been prepared, although the Committee, consisting of representatives of the Oil and Colour Chemists' Association and the Paint and Varnish Society, had been at work during the year. Dr. Newton Friend was re-elected President.

Dr. T. M. Legge

Proposing the toast of "The Oil and Colour Chemists' Association" at the dinner, Dr. T. M. Legge, H.M. Chief Medical Inspector of Factories, said he had always had a tender place in his heart for the works chemist ever since, more than twenty years ago, he received notice of a mysterious illness and death in a chemical works in Scotland, which was described as a case of phosphorus poisoning. He knew it was highly unlikely that it could be phosphorus poisoning in a place where they were using Weldon stills, so he took the night mail to Scotland in March and arrived at a bleak Ayrshire coast town early in the morning and met the works chemist, whom he was rather going to haul over the coals for this death. But his anger was immediately dispersed by this remarkable utterance: "You come from the South; how beautiful the almond blossom must be against the blue sky there now!" (Laughter.) That was a perfectly disarming criticism on this subject of poisoning, which turned out to be arsenuretted poisoning.

As another instance of the value of the works chemist, he related how in 1915 one of our submarines had come into Harwich after only forty-eight hours at sea, and all the crew had shown mysterious symptoms of jaundice and one thing and another which could only be due to arsenuretted hydrogen gas. The question was how it got there. It was suggested by a colleague—a very ancient individual who was head of the medical services in the Admiralty—that a German spy had put arsenic into the carboys of sulphuric acid on the quay where they had waited to be used in the accumulators on the submarines. To humour him—because practically no arsenic had been found in the sulphuric acid—all the acid was subjected to a process of de-arsenification and then put into the batteries again. The submarine went out, but within twenty-four hours all the crew showed the same symptoms. He then suggested that the arsenic was in the lead plates of the accumulators, despite the statement that only the purest lead was used. As a matter of fact, 0·2 per cent. of arsenic was found in the lead plates of the batteries, and at an expenditure of some £100,000 all the batteries were renewed.

After a reference to the æsthetic pleasure which he got when visiting paint and colour works throughout the country, Dr. Legge referred to the subject of lead poisoning, and emphasised the manner in which this had decreased in recent years in paint and colour works. In 1901-2 there were 56 cases reported from such works, in 1914 this had been reduced to 21, and last year the number of cases was only 14. The cause of that had been the energy of factory owners in installing apparatus which removed the lead dust from the workers. In his opinion it was the inhalation of lead dust and fumes which was the cause of lead poisoning, and one of the most effective means of preventing this had been found to be to put in a ventilating fan. It was far more effective than relying upon the workpeople to make use of gloves, respirators, baths, etc.

The Proposed Amalgamation

The President, replying to the toast, spoke of the objects of the Oil and Colour Chemists' Association, and of the manner in which it stimulated the dissemination of information among those in the trade, and in that way prevented overlapping researches and enquiries. As to the new Institute, the Association was not prepared to merge with it and lose its own identity until it could see where it was going. When the Paint and Varnish Institute was running as a good going concern then the Association might be pleased to become part and parcel of it. There were many problems which would have to be considered and discussed very carefully before the Association could decide what its future should be.

Replying to the toast of "Our Guests," proposed in a humorous speech by Dr. H. H. Morgan, Mr. A. Seymour Jennings, treasurer of the Paint and Varnish Society, said there had been delay in forming the Institute owing to certain legal formalities. He understood that very shortly at a joint meeting the two bodies would be able to draw up articles of association for the new Institute, which he thought was not only overdue but might be described as a crying need. There was ample need for it, and while it might be desirable in some respects that the Association should not lose its identity, on the other hand, the main objects of such an Institute must be identical with those of the Association, which was in a sufficiently strong position to shape the Institute according to its wishes.

The Technical Press

Dr. R. S. Morrell, in proposing the toast of "The Technical Press," pointed out the purposes it served in the way of stimulation, information, and education, and noted the increased attention which technical and scientific interests now attracted in the press generally.

Mr. F. E. Hamer (THE CHEMICAL AGE), in responding, said that the appeal of the technical press, if more restricted than that of the daily papers, was more direct and effective. The manufacturer who wished to set his products before the particular industry for which he catered knew that in the general press 99 per cent. of those who read the announcement might be of no earthly use to him, whereas every reader reached through the trade and technical press was a possible customer. The technical press, on both its editorial and advertising sides, represented the principle of specialisation, concentration, and avoidance of waste, in contrast to the policy of diffusion which the daily papers followed. The technical or trade journal served its own industry in two very definite ways: first, by informing the public of what the industry was doing for public interests, and, secondly, by informing the trade itself concerning its own problems, by stimulating enterprise, and by promoting within the trade a sense of collective unity. Much was heard in these days of "class consciousness," sometimes of a rather mischievous character. It was another and benficent kind of class consciousness that the technical journal promoted—the consciousness of a community bound together by very close ties and common interests, and in which, in spite of individual competition, the success of the whole meant the success of every member. There was not only a growing sphere of influence for the technical and trade paper, but a steadily increasing demand for scientific and technical books of a high standard. They might be interested to know that Ernest Benn, Ltd., a branch of the firm with which he was associated, had arranged with Dr. Morrell to edit a series of text books on "Oil and Colour Chemistry," and in addition volumes were in preparation on *The Chemistry of Paints, Pigments and Varnishes, The Chemistry of Soaps,* and *The Chemistry of Essential Oils.*

Accuracy of Titration

To the Editor of THE CHEMICAL AGE.

SIR,—In reference to the article in your issue of May 5 on "Accuracy of Titration," the author may be reminded that all indefiniteness in the end point of a titration with methyl orange is eliminated by adding a drop of xylene-cyanole FF. Without that I never make a titration unless I have two or three test glasses at hand with (*a*) colour and tint I wish to get at, (*b*), (*c*) a little to the acid side and a little to the alkaline.

—Yours, etc.,

CHEMIST.

Gaseous Combustion at High Pressures

Professor Bone at the Royal Institution

PROFESSOR W. A. BONE lectured on Friday, May 11, at the Royal Institution, London, on "Gaseous Combustion at High Pressures," and described experiments carried out by him and his co-workers, Messrs. D. M. Newitt, B.Sc., and D. T. A. Townsend, B.Sc. The late Mr. Hayward, M.Sc., had also been largely associated with the earlier part of the work, but had unfortunately lost his life in connection with an accident occurring in the course of the investigation.

The object of the experiments was to measure the change in pressure when simple gases such as hydrogen and carbon monoxide were exploded in a bomb at an initial pressure of about 50 atmospheres. Slides were shown of the bomb, which was of heavy cast iron, with an inlet plug for the gases, an ignition plug and a Petavel manometer to measure the pressure developed.

Means of Measuring the Pressure

The Petavel manometer worked, he said, on the principle of measuring the bulge on the wall of the bomb. There was a strong controlling spring. Its movement was magnified optically, and by means of an electrically controlled tuning fork with a periodicity of 100 a photographic record of the pressure changes was obtained direct.

The Combustion of Carbon Monoxide

The gases chosen for investigation were hydrogen and CO, which were exploded usually with a "normal" mixture of air—that is, with just sufficient air for complete combustion. There were several interesting points about the combustion of these gases; thus the volume and energy changes were similar, as shown by the equations :—

$2\ H_2+O_2=H_2O+68{\cdot}4$ kilogram units per gram molecule.
$2\ CO+O_2=2CO_2+68{\cdot}0$ kilogram units per gram molecule.

Yet simple experiments showed considerable differences in their flames. The lecturer then showed jets of hydrogen and CO burning under the same pressure, the flickering non-luminous flame of the former contrasting with the steady blue flame of the latter. He also exploded "normal" mixtures of the two gases with air in gas jars, the hydrogen giving a sharp report while the CO burned slowly. It was also shown that carbon monoxide would not burn in specially dried air.

The results of the experiments in the bomb showed that when hydrogen was exploded the maximum pressure was reached in about 1/200th second, while a similar mixture of carbon monoxide and air took a third of a second to reach the maximum. If, however, a small proportion of hydrogen were added to the CO and exploded (always with a "normal" air mixture), then the pressure curve at once had the characteristic shape of the hydrogen explosion. Professor Bone advanced the theory that the combustion of CO was delayed by the fact that it could only combine with monatomic oxygen or with "activated" steam molecules. By carrying out experiments on mixtures of carbon monoxide and hydrogen, and observing the proportions of CO_2 and water formed on explosion with oxygen with different mixtures, he had shown that while the combustion of hydrogen was a diatomic reaction, that of CO was monatomic. Thus the change represented by the usual equation did not occur: $2CO+O_2=2CO_2$, but only the following were possible: $CO+O=CO_2$; or $CO+H_2O=CO_2+H_2$.

The Effect of Diluents

Continuing, the lecturer said that the difference between CO and hydrogen did not stop there. After the point of maximum pressure hydrogen showed a normal cooling curve, but with CO the pressure remained stationary for some two-thirds of a second at least. By exploding CO with oxygen in the presence of hydrogen, argon or excess oxygen in place of nitrogen in the air, curves of a normal type were obtained, so that nitrogen seemed to exert a specific action on the combustion of carbon monoxide. Some of the energy of the combustion appeared to be absorbed and returned later. Professor Bone then showed the audience that the washings of the bomb after a hydrogen explosion contained no nitric acid when tested with diphenylamine, while washings obtained after a CO explosion gave a strong positive reaction. The theory advanced was that the combustion of the monoxide produced some activated nitrogen which combined with some of the oxygen present.

Production of Nitric Acid

After referring briefly to the facts discovered in connection with active nitrogen by Lord Rayleigh, Professor Bone said that he thought that if he could only get higher pressures he would actually be able to make nitrogen burn. This would require a new and stronger bomb, however. He foresaw commercial possibilities in the production of nitric acid by the explosion of blast furnace gases, *free from hydrogen*, with air in a bomb, a process which he hoped this country would seize upon rather than let it go elsewhere.

The Dyestuffs Act at Work

The Cotton and Wool Dyers' Association

IN his speech as chairman of the British Cotton and Wool Dyers' Association, Ltd., at the annual meeting of the Association in Manchester on Wednesday, Dr. Adolph Hoegger made some references to the present high charges for dyeing and bleaching, the working of overtime in periods of stress, and the Dyestuffs Importation Act.

So long as labour and coal costs were practically double those of 1914, and chemicals and dyes up to ten times their pre-war figure, he said dyers and bleachers could not be expected to do more than give their customers from time to time the advantages of any reductions which came their way. He stated that there was no price ring in the Lancashire dyeing trade.

On the question of overtime, he said it was no more desired by employers than by employees, but merchants and shippers were often obliged to give exact dates of delivery of goods to their customers abroad, and might find it necessary to press their dyers and bleachers for quick delivery. Such demand could at times only be complied with by resorting to overtime. Late deliveries of goods by manufacturers, merchants, or shippers might lead to heavy claims or cancellation of orders altogether. Buyers abroad were becoming more and more independent of British products, and many orders, in consequence of the inability to give times of deliveries, were finding their way into the hands of foreign producers. Trade Unions should show a little more elasticity in such matters.

When the Dyestuffs Importation Bill was being introduced, towards the end of 1920, Dr. Hoegger continued, the majority of colour users gave their assent on the distinct understanding that the textile and other colour-using industries should not be placed in an unduly disadvantageous competitive position. Unfortunately, the pledge given by the Government had not been kept, and British colour-users had to pay far higher prices for dyestuffs than those charged to competitors abroad. The Licensing Committee, they now understood, had recently agreed to grant licences, with certain reservations, for dyestuffs where the British equivalent was more than three times the pre-war prices—strength and quality, of course, being taken into consideration. If that had been carried out it would have given satisfaction, but their experience was that it had not been. They had had many applications refused where the British makers' prices were far above three times the German pre-war price, and the reasons given for refusal were by no means satisfactory.

"We are as anxious as anyone to see the dye-making industry of this country firmly established and made a great success" Dr. Hoegger added, "but we do not think it right or fair that it should be built up entirely at the expense of colour-users. We agree with opinions expressed elsewhere that for a given period the Government should grant a direct subsidy to British dyemakers, and no doubt colour-users would be quite willing to contribute some percentage towards the required amount."

Trade Fair in Jugo-Slavia

THE Third Ljubljana (Laibach) International Trade Fair will be held from September 1 to 10. It is understood that there is a market in Jugo-Slavia for chemical and pharmaceutical products, electro-technical and other machinery, also for celluloid products. Stand prices vary from 60 to 100 dinars per square metre, according to the position of the stand. A booklet and specimen application form (in French) may be seen on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.

A "Universal" Gas Mask

Results of United States Research

THE development of a "universal gas mask" which is considered to have the widest application of any gas mask thus far devised is announced by the U.S.A. Department of the Interior as the result of experimental work performed by the Bureau of Mines at its Pittsburgh station. The Department also announces the development of a "fireman's canister" similar to the "universal canister," but smaller and lighter, thus making it more convenient for the use of city firemen. By the use of these types of gas masks workers in many metallurgical and chemical plants may encounter a variety of gases, and city firemen may meet almost any type of gas or vapour and do work that they could not do otherwise, except at the risk of death or serious disability.

The army gas mask as developed during the war gave protection against all the poisonous gases, vapours and smokes encountered on the field. But when, after the war, army-type gas masks were advocated for use in metallurgical, chemical and other industries where noxious gases or fumes occur, the Bureau of Mines immediately pointed out that the masks give no protection against ammonia gas used in refrigerating plants, or against carbon monoxide, a constituent of blast-furnace gas, producer gas, water gas and coal gas. Recently, special gas masks having canisters containing absorbents designed for protection against ammonia or from carbon monoxide have been developed, but these afford little or no protection against other gases.

To combine efficiently in one canister the absorbents for all noxious gases is difficult, because the absorbents for certain gases are best when moist, whereas an absorbent or catalyst for carbon monoxide can be used only when perfectly dry. Hence it becomes necessary to use dry absorbents for the other gases.

Details of Two Types

After an extended series of experiments by the Bureau of Mines the "Universal" gas mask was developed. The canister contains granular absorbents, consisting of activated charcoal, for removing organic vapours; a filter of cotton wool for removing smokes, dusts and mists; caustic soda fused on pumice stone for removing acid gases; another cotton-wool filter; fused calcium chloride for extracting water vapour that inhibits action of the next absorbent; "hopcalite," a mixture of oxides of manganese and copper, with sometimes silver and cobalt that destroys carbon monoxide; and, finally, silica gel for adsorbing ammonia. The complete mask and harness weight about 8½ lb. The "Fireman's canister" weighs about 5½ lb. and is more convenient to wear than the "Universal" mask.

The "Universal" and the "Fireman's" gas masks may be worn in air containing small quantities of any noxious gas. An abundance of air is necessary, because the gas mask does not furnish the wearer with any of the oxygen necessary for life. An atmosphere in which a safety-lamp flame goes out must never be entered by a man wearing a gas mask. Oxygen breathing apparatus or air helmets only can be used in such places.

Most noxious gases may be detected by their odour or taste when they penetrate a canister, either because of its being exhausted or of its activity being insufficient to absorb a high concentration, so that one has time to escape from a dangerous atmosphere before he has breathed enough of the gas to cause injury. Carbon monoxide, however, has no taste nor odour; a man who breathes it may not be aware of its presence until he becomes greatly weakened or nauseated; he may lose consciousness without receiving any warning. Because of the danger from using an exhausted canister, a limit of six hours' use is put upon the "Universal" and four hours on the "Fireman's" canisters. In cool or cold weather the canisters should be worn under a coat because when warm they are more active against carbon monoxide than when they are cold.

Masks of the "Universal" type are useful for emergency purposes around chemical plants or the like in which many different gases or vapours may be met. Gas masks, however, should not be used in mines for rescue and recovery purposes after explosions, because at such times the mine atmosphere is apt to lack oxygen. Self-contained oxygen breathing apparatus which carry supplies of compressed oxygen are needed for mine rescue work. When the atmosphere contains enough oxygen to support a lamp flame the "Universal" or the "Fireman's" gas mask will give protection against most gaseous hazards.

Tests of the "Universal" gas mask in actual service have totalled 14 hours without signs of failure. The arbitrary life of six hours has, however, been adopted because of the inability of a wearer to detect penetration of carbon monoxide; penetration of other gases may be detected by taste or smell. A canister fails gradually, so that the wearer has time to escape from a dangerous atmosphere before the concentration of gas breathed becomes hazardous. The "Fireman's" mask has a shorter life than the "Universal" mask—four hours as compared with six hours. Both figures allow a large factor of safety.

Details regarding these gas masks are given in Technical Paper 300, by S. H. Katz, J. J. Bloomfield and A. C. Fieldner, copies of which may be obtained from the Department of the Interior, Bureau of Mines, Washington, D.C.

American and Sicilian Sulphur

Agreement between Producers

IN a report dated March 27, the United States Consul in Rome gives some interesting details of the agreement recently made by American and Sicilian producers of sulphur. Mr. Russell states that the essential points of the accord concern the determination of the sales prices and the designation of the quantities to be placed by each of the contracting parties.

Prices will be fixed from time to time with reference to the conditions in the individual consuming countries, and in such a manner as to reach gradually the pre-war level.

By agreement made at the time of signing the accord, prices have on the average been increased by more than one dollar per ton over those provisionally determined in October, 1922.

Division of Markets

With regard to the division of markets, it has been decided that the American production shall supply the demands of North America, while the Italian product will be reserved for the national needs. The remaining world consumption will be met in determined proportions by America and Sicily, to the latter being given the exclusive right of sale up to 65,000 tons for the manufacture of sulphuric acid in any country. On the basis of the approximate figures of the present world consumption, it is calculated that Sicily will be able to export annually about 145,000 tons of raw and worked sulphur, in addition to the 65,000 tons destined for the manufacture of sulphuric acid. These quantities are considerably greater than those exported by Italy in the last few years.

The exportation of raw sulphur to individual markets will then be regulated, taking into account as far as possible the advantages accruing to each of the contracting parties from their geographical position in relation to the various consuming countries. The exportations of worked sulphur remains entirely unfettered. The contracting parties are pledged to maintain the present situation in the industry of refining and grinding of sulphur, which represents a guarantee for the Italian production of worked sulphur.

The duration of the agreement is fixed until September 30, 1926, and may be prolonged. It is, however, permitted for the parties to denounce the convention even before the above date by a notice from one to the other of not less than 6 months. However, it is arranged that the rupture of the agreement will not take place during the sulphur selling season.

There is also created a central office in London with representatives of both parties for the exchange of data, information and statistics, and for the maintenance of a closer contact between the parties themselves in regard to the execution of the agreement.

Settlement of Disputes

Each dispute that may arise over the same will be submitted to the judgment of a board of arbitration with headquarters in London, composed of a representative of each of the parties and of a third named by the first two, or, in default thereof, by the president of the Chamber of Commerce.

The agreement is viewed with much satisfaction by the Sicilian producers, who consider it of great importance to the sulphur industry as giving to it a period of recuperation and relative tranquillity necessary to cure the evils of the recent past and to provide for a better system and organisation.

April Trade Returns

THE official trade and navigation returns for the month of April are now available, and we give below the detailed figures of quantities for the import and export of various chemical and allied products for the month, compared with the figures for April, 1922. The corresponding figures for the month of March were given in the issue for May 5. The total value of the imports of chemicals, dyes, drugs and colours combined, for the month of April was £1,187,466, which represents an increase of £244,061 over April, 1922, but a decrease of £165,290 over the March figures. The exports of chemicals, etc., grouped as above, show a general increase both over April, 1922, and March of this year, the values being £2,050,473 (April, 1923), £1,617,695 (April, 1922) and £1,912,077 (March, 1923). Coming to the detailed quantities given below, it will be noticed that the majority of substances show increases both under the heading exports and imports. The greatest decrease in imports is crude glycerin, while crude coal tar products generally tend to show a decreased export.

Imports for April

INCREASES.

		1923.	1922.
Acid acetic	tons	678	270
,, tartaric (including tartrates)	cwts.	3,244	1,664
Bleaching materials	cwts.	1,862	1,586
Borax	cwts.	6,989	2,505
Calcium carbide	cwts.	69,023	29,554
Red lead and orange lead	cwts.	4,109	1,301
Nickel oxide	cwts.	884	—
Sodium nitrate	cwts.	65,037	8,120
,, compounds (except nitrate)	cwts.	13,971	12,672
Cream of tartar	cwts.	2,337	794
Zinc oxide	tons	540	396
Coal tar intermediates (including aniline oil, and salt, and phenyl glycin)	cwts.	1	—
Unspecified coal tar dyes	cwts.	3,206	2,767
Barytes (including blanc fixe)	cwts.	78,428	64,575
Unspecified painters' colours	cwts.	55,695	45,711
Mercury	lbs.	113,978	91,568

DECREASES.

Glycerin, crude	cwts.	1,334	3,342
,, distilled	cwts.	433	438
Potassium nitrate	cwts.	8,516	18,367
,, compounds (except nitrate)	cwts.	508,471	559,638
Alizarine	cwts.	95	105
White lead	cwts.	6,264	10,541

Exports for April.

INCREASES.

		1923.	1922.
Acid, sulphuric	cwts.	1,403	998
,, tartaric (including tartrates)	cwts.	1,133	278
Ammonium sulphate	tons	13,681	8,951
Bleaching powder	cwts.	17,451	16,854
Anthracine	cwts.	3	—
Naphthalene	cwts.	17,652	1,713
Tar oil, creosote, etc.	cwts.	2,426,831	1,370,954
Glycerin, crude	cwts.	5,319	1,029
,, distilled	cwts.	7,808	1,110
Potassium chromate and bichromate	cwts.	2,002	1,471
Sodium carbonate, etc	cwts.	588,823	340,516
Caustic soda	cwts.	155,258	133,210
Sodium sulphate, including salt cake	cwts.	69,911	50,167
Other sodium compounds (except chromates)	cwts.	46,880	30,867
Zinc oxide	tons	456	237
Coal tar dyes	cwts.	7,209	4,354
Other synthetic dyes	cwts.	5,874	4,131
Barytes (including blanc fixe)	cwts.	6,832	4,065
White lead	cwts.	15,790	11,773
Paints, etc., ground in oil or water	cwts.	26,336	22,251
Paints and enamels ready mixed	cwts.	25,665	14,850

DECREASES.

Ammonium chloride	tons	275	584
Benzol and toluol	gals.	10,169	13,316
Carbolic acid	cwts.	9,980	12,409
Naphtha	gals.	3,605	7,276
Unspecified crude coal tar products	cwts.	22,305	30,098
Copper sulphate	tons	7,577	7,691
Potassium nitrate	cwts.	1,024	1,653
Potassium compounds unspecified	cwts.	1,706	12,759
Sodium chromate and bichromate	cwts.	2,730	2,925
Painters' colours, etc., unspecified	cwts.	43,353	47,417

Chemical Matters in Parliament

Crude Oil Imports

MR. SHINWELL (House of Commons, May 14), asked the President of the Board of Trade the total imports of crude oil for the year 1922, and the value of the same, and the countries from which these products were exported ?

Lieut.-Colonel Buckley in reply, gave the total quantity, and declared value of crude petroleum imported into the United Kingdom during the year 1922, distinguishing the principal countries whence consigned :

Consigned from :	Gallons.	£
Persia	191,618,429	2,639,825
Mexico	24,673,029	365,788
British West India Islands	753,851	16,958
United States	75,606	3,805
Other Countries	13,000	776
Total Imports	217,133,915	3,027,152

Preservatives in Foodstuffs

Mr. A. Bennett (House of Commons, May 16) asked the Minister of Health the composition of the small Committee he had appointed to inquire into the general question of the use of preservatives colouring matter in foods. To which Mr. Neville Chamberlain replied that this matter was under consideration, and that he was not yet in a position to announce the composition of the proposed Committee.

Royal Cordite Factory

Mr. Duncan (House of Commons, May 16) asked the Parliamentary Secretary to the Admiralty whether, having regard to the reductions in wages which had taken place among Admiralty employees at the Royal Cordite Factory, Holton Heath, amounting to 16s. 6d. per week since July, 1922, in addition to the withdrawal of the workmen's season tickets, which entailed a further reduction in their purchasing power on the average of 5s. 4d. per week thereby reducing their actual wages to 35s. 8d. per week, and the prolonged period of short time at the same depot, as compared with other Admiralty establishments, the Board of Admiralty could see their way to review their previous decision on this question. Commander Eyres-Monsell replied that he regretted that he was unable to add anything to his reply of April 30 on this subject.

"The Tragedy of Gretna"

In the course of debate in the House of Commons, on Wednesday, May 9, Dr. Chapple called attention to what he called "the tragedy of Gretna," and stated that the town and factory had cost this country more than £9,000,000. In spite of the advice given by a Special Committee, set up by the late Government, this sum of money had been frittered away. An expert committee was formed in February, 1919, consisting of members of the Ministry of Munitions, of Sir William Pearce, Sir Edward Pearson, Colonel Cobb, and other experts, so that all Departments of State and War were represented.

The Committee presented a report in which they said that Gretna, being a modern factory, should therefore be kept in preference to the older factory at Waltham. They also said that Gretna was in a position to manufacture cordite cheaper than at Walthan Abbey; furthermore, it had its own oleum plant, glycerin distillery, ether plant, and solvent recovery plant. The Committee also pointed out that a part of the Gretna ether plant could be used, beside its factory uses, for the conversion of alcohol to ether and the treatment of the ethyl alcohol recovered. The Committee considered, however, that every encouragement should be given to induce industries to start in the neighbourhood. This could be done by the Government offering cheap power and water and also facilities over the factory railways. As some of the warehouses and stores at Gretna would not be required to the full capacity, it would be possible to store certain Government stocks there. The above was the advice tendered by the Committee to the Government; and was apparently ignored by them. Dr. Chapple asked the Financial Secretary to the War Office for an explanation, stating why the expert advice was ignored.

From Week to Week

THE CHEMICAL EMPLOYERS' FEDERATION has given notice nationally that shiftmen are to have their pay reduced by ½d. per hour, in two instalments of ¼d.

A VESSEL CONTAINING two thousand tons of sulphate of ammonia caught fire in dry dock at Poplar on Tuesday morning; the fire was subdued four hours later by flooding the steamer.

IT IS STATED that the wages dispute in Staffordshire between members of the National Flint Glassmakers' Society and the employers has been settled, the men accepting a reduction of 4s. per full week of eight turns.

THE death is announced of Mr. JULIUS R. W. HULSEN, of Julius Hülsen and Co., Newcastle-on-Tyne. It is understood that the business will be carried on under the same name by Mr. F. G. Marshall, who was the late Mr. Hülsen's sole partner.

A REPORT FROM Düsseldorf states that a subterranean oil conduit leading from the Phœnix Works into unoccupied Germany has been discovered, and is being examined by the French engineers. It is said that benzene has been conveyed into unoccupied Germany by this channel.

SIR ALMROTH WRIGHT, D.Sc., F.R.S., has been appointed by the Board of Trinity College, Dublin, as the representative of the University at the Pasteur celebrations in France, and have entrusted him with addresses of congratulation for the Universities of Paris and of Strasburg.

THE SPELTER TRADE of Swansea will receive a considerable impetus through the Government's decision to place a ten years' contract there. Commencing in June, large shipments of zinc ore from Australia are to be sent to Swansea and will be distributed amongst local spelter works.

THE WELSH SIEMEN'S STEEL MAKERS, at Swansea on Saturday, decided to reduce the price of steel bars from £10 to £9 2s. 6d. per ton, less 7s. 6d. for consumption at local works. Following this reduction, Welsh tinplate makers reduced tinplate to 23s. 1½d. a standard box.

ACCORDING to a Department of Overseas Trade report very considerable progress has been made in Cuba in the manufacture of fuel alcohol from waste sugarworks products for use in motor-cars instead of petrol. Most of the public motor vehicles in Havana are run on it, but the bulk appears to be exported.

A PAPER, dealing with experiments on the origin and development of the large ions or electrical carriers in air, by Professor J. J. Nolan, D.Sc., and Mr. J. Enright, was read by the former in the Royal Irish Academy, Dublin, on Monday, Professor Sydney Young, F.R.S., President of the Academy, being in the chair.

THE SPRING MEETING of the Iron and Steel Institute was opened in London on Thursday, May 10, at the Institution of Civil Engineers. The president, Mr. Francis Samuelson, who occupied the chair, presented the Bessemer gold medal to Dr. W. H. Maw after the formal business of the meeting had concluded. A selection of papers was then read.

A SUBSIDIARY of the American General Motors Corporation, to be known as the General Motors Chemical Co., is about to use petrol filling stations for placing a modified type of petrol on the market which contains an "anti-knock" compound which has been developed as a result of research by the General Motors Research Corporation, and is understood to be an organo-metallic compound.

AT THE BIRMINGHAM POLICE COURT on Tuesday, Charles Hall Betts, of 12 and 13, Hanover Street, Birmingham, was fined £5 for selling bottles of gold paint containing petroleum mixture without having the words ":Highly inflammable" in conspicuous letters printed on the labels. A further fine of 40s. was imposed for storing 20 gallons of petroleum mixture beyond the quantity for which he was licensed.

A LECTURE was given at Carlisle on Thursday, May 10, by Mr. Fraser Thompson, chief chemist of Scottish Dyes, Ltd., describing how the chemists of the firm overcame the difficulties at the beginning of the war arising out of the fact that German dye supplies were cut off. Sir Frederick Chance, who was in the chair, said that he was of the opinion that it was essential from a national point of view that it should be fostered for a time.

MR. VICTOR HOBSON GOLDTHORPE, a research chemist of the British Dyestuffs Corporation, Huddersfield, is reported to be missing in the Isle of Wight, and through the police there a reward of £10 has been offered for information regarding his whereabouts. Mr. Goldthorpe, who is 34 years of age, resided at 100, Yews Hill Road, Lockwood, Huddersfield, and as he had been in indifferent health he had gone to the Isle of Wight to recuperate.

MRS. MOND, widow of Dr. Ludwig Mond, died on Wednesday morning at her residence, The Poplars, Avenue Road, Regent's Park, after a long illness. She was Frida, only child and heir of Adolph Meyer Löwenthal, of Cologne, by his marriage to Johanna, daughter of and co-heir of Aaron Levinsohn, of Cassel. She was married in 1866 to her cousin, Dr. Ludwig Mond, F.R.S., the great industrial chemist and founder of the firm of Brunner, Mond, and Co. He died in December, 1909. Mrs. Mond leaves two sons, Dr. Robert Ludwig Mond, F.R.S., hon. secretary to the Davy-Faraday Laboratory of the Royal Institution, and Sir Alfred Mond, M.P.

THE BRITISH ASSOCIATION will hold its annual meeting this year at Liverpool, after an absence of twenty-seven years from that city. Sir Ernest Rutherford is to be the President, and he will deliver his address in the Philharmonic Hall on the evening of September 12, his subject being "The Electrical Structure of Matter." As presidents of sections the presence of many scientists has been secured, including Professor J. C. M'Lennan, F.R.S., Toronto, (mathematics and physics) and Professor F. G. Donnan, F.R.S. (chemistry). The Lord Mayor and Lady Mayoress will give a reception at the Walker Art Gallery, and the programme includes excursions and a *soirée* at the University.

THE SIGNIFICANCE OF THE GERMAN chemical industry in relation to that of America, has led the U.S. Department of Commerce to appoint Dr. F. E. Breithut to the staff of Commercial Attaché Herring at Berlin as Chemical Trade Commissioner. In selecting Dr. Breithut for this post, the Department of Commerce secures the services of a trained chemical economist. He has contributed several articles to the literature of chemistry, both popular and technical. His technical publications include "The Economic Status of the American Chemical Industry," "The Inspection of Establishments Producing, Using or Refining Wood Alcohol," and "A New Method of Measuring the Partial Vapour Pressures of Binary Mixtures."

THE HARDINGE CO., of London and New York, announce that they have acquired the sole European manufacturing and selling rights of the patented "Gayco" air separator. This separator is capable of delivering products down to 350 mesh, and is largely used in the United States. A number of these separators have been installed in conjunction with Hardinge Mills for producing powdered talc, silica, felspar, limestone, and cement. An order has recently been placed with the Hardinge Co. of Great Britain for the production of slate dust, the equipment including Hardinge Mills, Hummer Screens, and 14 ft. diameter "Gayco" Separator. Orders from British companies have been received this month for British-built Hardinge Mills for the fine grinding of silica by the wet method and the fine grinding of barytes by the dry method.

LECTURING to the Gloucestershire Chamber of Agriculture, Sir John Russell, director of the Rothamsted experimental station, said that the number of nitrogenous fertilisers had increased since the war. These were not better than the old-established nitrate of soda and sulphate of ammonia, but they added to the supply. One of these—urea—appeared to be mid-way between nitrate of soda and sulphate of ammonia in effectiveness, and was likely to be imported from the Continent. Another ammonium chloride, which might be produced in this country, did not appear to be quite so good as sulphate of ammonia in most instances, though in many cases it seemed to act as well, if not better. The possible output of those two new fertilisers was enormous and was limited only by the demand, since the nitrogen could be obtained from the air.

References to Current Literature

British

GAS PRODUCERS.—Recent developments in gas producers. T. R. Wollaston and A. L. Booth. *J.S.C.I.*, May 11, 1923, pp. 200–203 T.

TANNINS.—Synthetic tannins. R. B. Croad. *J.S.C.I.*, May 11, 1923, pp. 203–207 T.

SOLVENTS.—The correlation of solvent power and the viscosity of cellulose ester solutions. E. W. J. Mardles. *J.S.C.I.*, May 11, 1923, pp. 207–211 T.

DUST EXPLOSIONS.—The factors determining the choice of materials for stone-dusting of mines. A. C. Dunningham. *J.S.C.I.*, May 11, 1923, pp. 195–200 T.

ANALYSIS.—Determination of inorganic impurities in organic compounds soluble with difficulty in water, such as sulphuric acid in picric acid. T. S Patterson and K L. Moudgill. *J.S.C.I.*, May 11, 1923, pp. 211–212 T.

The use of co-ordination compounds in analysis. T. M. Lowry. *J.S.C.I.*, May 11, 1923, pp. 462–465.

ISOTOPES.—The mass-spectra of chemical elements. Part IV. F. W. Aston. *Phil. Mag.*, May, 1923, pp. 934–945.

REACTIONS.—The application of the Hofmann reaction to substituted carbamides. G. R. Elliott. *Chem. Soc. Trans.*, April, 1923, pp. 804–813.

United States

HYDROGEN.—Production of hydrogen by the thermal decomposition of oil. Part I. E. R. Weaver. *Chem. and Met. Eng.*, April 30, 1923, pp. 764–768.

CORROSION.—Corrosion of rust-proofed iron and steel. W. P. Wood. *Chem., and Met. Eng.*, April 30, 1923, pp. 769–772.

GLASS.—Anti-dimming preparations for glass surfaces. H. A. Kuhn. *Chem. and Met. Eng.*, April 30, 1923, pp. 762–763.

OILS.—The organic matter in oil shales. R. H. McKee and R. T. Goodwin. *J. Ind. Eng. Chem*, April, 1923, pp. 343–349.

The heat treatment of China wood and linseed oils. C. F. Mabery. *J. Ind. Eng. Chem.*, April, 1923, pp. 365–367.

Losses in the refining of edible oils. B. H. Thurman. *J. Ind. Eng. Chem.*, April, 1923, pp. 395–397.

GLUE.—Control of the gelling point of glue. R. E. Wilson and W. B. Ross. *J. Ind. Eng. Chem.*, April, 1923, pp. 367–370.

The hygroscopicity of hide glues and the relation of tensile strength of glue to its moisture content. E. Bateman and G. G. Town. *J. Ind. Eng. Chem.*, April, 1923, pp. 371–375.

CEMENTS.—Physical properties of dental cements. Part II. P. Poetschke. *J. Ind. Eng. Chem.*, April, 1923, pp. 339–342.

FUEL.—Coal carbonisation and the world's fuel. H. C. Porter. *J. Ind. Eng. Chem.*, April, 1923, pp. 335–338.

Producer gas from powdered coal. R. T. Haslam and L. Harris. *J. Ind. Eng. Chem.*, April, 1923, pp. 355–357.

CELLULOSE.—An improved method for the determination of alpha-, beta-, and gamma-cellulose. M. W. Bray and T. M. Andrews. *J. Ind. Eng. Chem.*, April, 1923, pp. 377–378.

DYESTUFFS.—The synthesis of Dicyanine A. S. Palkin. *J. Ind. Eng. Chem.*, April, 1923, pp. 379–381.

CATALYSIS.—The adsorption of gases by oxide catalysts. A. F. Benton. *J. Amer. Chem. Soc.*, April, 1923, pp. 887–899.

Adsorption and catalysis in carbon monoxide oxidation. A. F. Benton. *J. Amer. Chem. Soc.*, April, 1923, pp. 900–907.

The influence of temperature, pressure and supporting material for the catalyst on the adsorption of gases by nickel. A. W. Gauger and H. S. Taylor. *J. Amer. Chem. Soc.*, April, 1923, pp. 920–928.

HALOGEN COMPOUNDS.—The preparation and separation of ortho- and para-chloroanilines. H. C. Bashioum and P. O. Powers. *J. Ind. Eng. Chem.*, April, 1923, pp. 407–408.

French

GLUCOSIDES.—The glucosides. H. Hérissey. *Bull. Soc. Chim.*, April, 1923, pp. 349–413.

ELECTRO-CHEMISTRY.—The electrolytic oxidation of benzene with a view to its conversion into quinone, and the electrolytic reduction of quinone. A. Seyewetz and G. Miodon. *Bull. Soc. Chim.*, April, 1923, pp. 449–459.

OPTICALLY ACTIVE COMPOUNDS.—The resolution of para-nitro- and meta-nitro-phenoxypropionic acids. E. Fourneau and G. Sandulesco. *Bull. Soc. Chim.*, April, 1923, pp. 459–465.

KETONES.—A new reaction of ketones. C. Gillet. *Bull. Soc. Chim.*, April, 1923, pp. 465–466.

ORGANO-METALLIC COMPOUNDS.—A cacodylate of bismuth. P. Clausmann. *Bull. Soc. Chim.*, April, 1923, pp. 447–448.

CEMENTS.—Cements with a high alumina content. J. Bied. *Bull. Soc. d'Encour.*, January, 1923, pp. 31–43.

PIGMENTS.—The lithopone problem. J. Frère. *Rev. Prod. Chim.*, April 30, 1923, pp. 253–256.

GLUCINUM COMPOUNDS.—The salts of glucinum. A. Hutin. *Rev. Prod. Chim.*, April 30, 1923, p. 257.

German

COMPLEX COMPOUNDS.—The introduction of acid amides into ferric and chromic acetates. R. Weinland and H. Hachenburg. *Z. anorg. u. allg. Chem.*, March 1, 1923, pp. 285–304.

ANALYSIS.—The quantitative determination of trithionates in the presence of tetrathionates. E. H. Riesenfeld, E. Josephy and E. Grünthal. *Z. anorg. u. allg. Chem.*, January 26, 1923, pp. 281–284.

Analytical precipitation in extreme dilution. F. L. Hahn. *Z. anorg. u. allg. Chem.*, January 26, 1923, pp. 257–268.

The examination of benzene and benzol. J. Pritzker and R. Jungkunz. *Chem.-Zeit.*, April 12, 1923, pp. 313–315.

Determination of benzol in gas by the use of active charcoal. A. Krieger. *Chem.-Zeit.*, April 26, 1923, pp. 357-358.

Analytical estimation of zinc using the molybdenum blue reaction. G. F. Hüttig. *Chem.-Zeit.*, April 21, 1923, pp. 341–342.

ADHESIVES.—The industry of adhesives. Part II. H. Wagner. *Chem.-Zeit.*, April 5, 1923, pp. 289–291.

HAFNIUM.—The discovery of hafnium and the present state of our knowledge of this element. G. von Hevesey. *Chem.-Zeit.*, April 24, 1923, pp. 345–346.

SUGARS.—Determination of dextrose in sugar mixtures, particularly artificial honey. G. Bruhns. *Chem.-Zeit.*; Part I., April 19, 1923, pp. 333–335; Part II., April 26, 1923, pp. 358–360.

SOLUTION.—The velocity of solution of copper in dilute benzaldehyde and its dependence upon the viscosity. F. Schaaf. *Z. anorg. u. allg. Chem.*, January 26, 1923, pp. 237-253.

SYSTEMS.—The system ammonium nitrate—ammonia. F. Halla and K. Hirschko. *Z. anorg. u. allg. Chem.*, March 13, 1923, pp. 137–152.

The systems hydrazine—ammonia and water—ammonia. F. Friedrichs. *Z. anorg. u. allg. Chem.* March 23, 1923, pp. 221–228.

HYDRIDES.—Boron hydrides. Part VI. The simplest boron hydride. A. Stock and E. Kuss. *Ber.*, April 11, 1925, pp. 789–808.

COMBUSTION.—The formation of hydrogen peroxide in the combustion of hydrogen. M. Hauser. *Ber.*, April 11, 1923, pp. 888–894.

REACTIONS.—The effect on the reaction between nitrohalogen-hydrocarbons and aniline of different substituents in the latter. B. Linke. *Ber.*, April 11, 1923, pp. 848–851.

The interaction of amino-acetals with phenols and phenol-ethers. O. Hinsberg. *Ber.*, April 11, 1923, pp. 852–857.

Aldol condensation between chloral and phenols. H. Pauly and H. Schanz. *Ber.*, April 11, 1923, pp. 979–985.

Patent Literature

Abstracts of Complete Specifications

195,995–6. Paints, Manufacture of. D. Gardner, Silvermere, Farris Lane, West Byfleet, Surrey. Application date, October 11, 1921.

195,995. The process is for treating bitumens, asphaltites, and similar substances for the manufacture of black paints, varnishes and japans. The material is washed with alkali and/or acid to ensure the removal of all alkali and acid-soluble substances. The volatile hydrocarbons are then removed by quickly heating the material to 125°–140° C. After this treatment, the proportion of the bitumen soluble in carbon bisulphide is increased from about 65 per cent. to 98·5 per cent. The bitumen is stirred during the heating, and then filtered while still at a temperature of 110° C. The solubility in carbon bisulphide at this stage may reach 99·8 per cent. The bitumen is then ground and stirred with solvent naphtha or the like, containing hydrocarbons boiling between 80° and 180° C. Alternatively, the bitumen may be stirred with the solvent in an autoclave at a temperature of 180° C. and pressure of 5–8 atmospheres. In this case, cymene may also be used as a solvent, and is preferably produced *in situ* by introducing turpentine and white anhydrous copper sulphate into the autoclave. The hot concentrated solution of the bitumen is now free from water, and may be mixed with the usual solvents, fillers, driers, etc. The non-inflammable property of the paint may be improved by adding solvents such as chloroform, carbon tetrachloride, dichlorethylene, tetrachlorethylene, or tetrachlorethane. Some of these solvents tend to effect the other qualities of the paint adversely, and it is preferred to use chlorine compounds of aromatic hydrocarbons, such as monochlorbenzene, dichlorbenzene, and higher products up to hexachlorbenzene. Small quantities of resinates and Acheson graphite of the special grade A.F.1, or silicide of carbon or other suitable silicides, or *o*- or *p*-triphenylphosphate or tricresylphosphate may also be added.

195,996. These paints are of the kind which contain oxides of the 4th, 5th and 6th groups of the periodic system, preferably those of titanium or zirconium. In this invention, the filler and base components used are compounds of metals of the same group, which have been calcined at a temperature below 600° C. Better results are obtained if the oxides or hydroxides used are produced cold by precipitation, and oxides of salts with a high melting point such as titanium oxide or zirconium silicate should be used. The base material is first calcined to remove moisture, and then mixed with the filler of the same periodic group. Examples of such mixtures are titanium oxide and silica, zirconium hydroxide and silica or kieselguhr. The first example yields a rust-preventing, heat-resisting paint when mixed with solvents such as turpentine, turpineol, dipentine, and chlorinated aromatic hydrocarbons. The second example yields a weather, acid, and alkali-resisting paint, but chlorinated aromatic hydrocarbons should not be used. Other ingredients such as oils, driers, etc., are also added. When producing a heat- and moisture-resisting paint, the pigment is treated in an autoclave at a pressure of 5–8 atmospheres with linseed oil, maize oil, castor oil, or the like.

195,998. Pure Alumina, Production of. M. Buchner, 1, Schellingstrasse, Hannover-Kleefeld, Germany. Application date, October 12, 1921.

Ammonium sulphate, or a double sulphate of ammonium and an alkali metal, is heated to produce the bisulphate, and then mixed with materials containing alumina such as bauxite or chamotte, and a small quantity of water, and heated under pressure. The product is leached with water, and the solution filtered from the residue of silicic acid. The solution is concentrated by evaporation, and mixed with an excess of hot saturated solution of ammonium sulphate. Ammonium alum crystallises, and is washed with ammonium sulphate, and the solid crystals then added to an excess of ammonia solution. Aluminium hydroxide is precipitated, and then filtered off. The concentration of the solution after leaching enables the iron and other impurities to be removed in one operation, and the washing of the alum with ammonium sulphate avoids repeated crystallisation. A large excess of ammonia is used, and a pure precipitate which is easily filtered is obtained. The mother liquor containing ammonium and iron sulphates may be used again, until it becomes necessary to remove the iron. It is found that ammonium sulphate or double sulphate cannot be heated in copper or iron vessels to produce the bisulphate, but vessels of silicon, aluminium, magnesium or their alloys with one another or with heavy metals may be used.

196,002. Decolorisation and Clarification of Fats, Oils, Sugars and Other Liquids, and Adsorptive Materials for Use Therein. A. C. Cumming and Klarit, Ltd., Stanley House, Field Lane, Litherland, Liverpool. Application date, October 14, 1921.

The specially active charcoal termed decolorising carbon which has been used for purifying fats, oils, sugars, etc., is replaced by carbon black which is substantially free from oil. If oil is present, even in very small proportion, the carbon black is only slightly active, and the oil must be removed by heating to a red heat. Carbon black of the kind used in rubber manufacture and for lithographic inks, which is produced by the decomposition or incomplete combustion of gaseous hydrocarbons having a high percentage of carbon, is found to be suitable. Other filtering substances, such as china clay or kieselguhr, may be added.

196,012. Insecticidal and Fungicidal Preparations, Process for the Manufacture of. J. A. Vielle, 17, Waterloo Place, London, S.W.1. Application date November 14, 1921.

An organic solid of low melting point, such as naphthalene or camphor, is mixed with water in the proportion of 3 to 7, and treated in a colloid mill such as that described in Specification No. 155,836 (see The Chemical Age, Vol. IV, p. 313). The dispersion is assisted by adding a very small proportion of soap, fatty acid, glue, gelatine, or a substance which contains an organic sulpho-group—*e.g.*, sulpho-salicylic acid or its compounds, or sulphonated castor oil. A colloidal solution is obtained, which is miscible in all proportions with water, and possesses a strong insecticidal and fungicidal action.

196,023. Methanation of Water Gas, and Manufacture of Methane from Such Gas. T. P. Hilditch, Birchdene, Cross Lane, Grappenhall, Cheshire, and Joseph Crosfield and Sons, Ltd., Warrington, Lancs. Application date, December 14, 1921.

It is found that if water gas is passed at a temperature between 220° and 300° C. over a catalyst such as nickel, part of the gas is converted into carbon dioxide and methane. In an example, 10 litres of water gas containing carbon monoxide 38 per cent., and hydrogen 41 per cent., were passed over 10 grams of nickel at 265°–270° C. at the rate of 45 litres per hour, and the yield of methane was found to be 1·6 litres. The process may be used for enriching water gas with methane, and removing the carbon dioxide produced, or it may be used for the manufacture of methane. In the latter case, the water gas may be passed over the catalyst several times, or at such a rate that only small quantities of hydrogen and carbon monoxide are left. These residual gases may be absorbed by means of copper oxide heated to 200°–250° C. The remaining mixture of methane and nitrogen is separated by liquefaction. The catalyst may be supported on granular material and other catalysts such as cobalt or cobalt-nickel mixtures may be used.

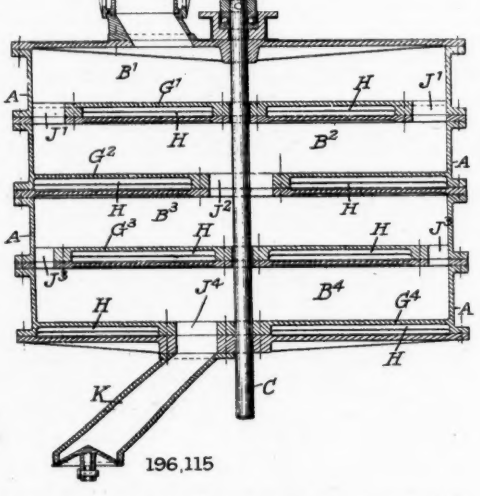
196,073. Detersive Agents, Manufacture of, and the Detersive Agents Produced Thereby. A. L. Mond, London. From the Kendall Products Corporation, 709, Sixth Avenue, New York. Application date, January 13, 1922.

The process is for producing a detersive base from vegetable or other products rich in starch or proteins, such as cereals, and certain legumes. The vegetable product is digested with alkali in the presence of an anhydrous alkaline salt capable of absorbing water of crystallisation. An excess of alkali is used to ensure that the whole of the vegetable material is acted upon, and the excess of alkali subsequently neutralised. The alkali is used to take up liberated water. The alkali digestion of the vegetable product, such as corn meal, is facilitated by

a preliminary heat treatment which destroys the structure of the material, and renders it more permeable to chemical reagents. The heating is continued for about two hours at a temperature of about 138° C. The product is then mixed with an anhydrous alkaline salt, such as sodium or potassium carbonate, which is capable of taking up a comparatively large quantity of water. The mixture is then treated with an excess of caustic soda of 40° Bé., in a steam-jacketed mixer. The water of the caustic solution and that liberated from the vegetable product are absorbed by the anhydrous salt. The excess of caustic alkali is now neutralised by adding a bicarbonate or other acid salt or an alkali, which converts the caustic alkali into carbonate. The product is a detersive base containing no undigested vegetable material, and no unfixed alkali. The product may be mixed with an ordinary soap to obtain a product which combines the properties of both. Alternatively, the latter product may be obtained by treating the mixture of vegetable product and anhydrous alkaline salt with sufficient caustic alkali, so that the excess may be combined with a fatty acid or suitable soap oil. The saponification is effected in the steam-jacketed mixer, and any excess of caustic alkali which remains is neutralised with sodium or potassium bicarbonate. In one example, the detersive base may be produced from corn meal 100 parts, sodium carbonate 100 parts, caustic soda solution of 40° Bé. 25 parts, and sodium bicarbonate 25 parts. A combined product of detersive base and soap may be obtained from corn meal 100 parts, sodium carbonate 100 parts, soap oil or fatty acid 100 parts, caustic soda solution 35 parts, and sodium bicarbonate 10 parts.

196,115. Drying and Neutralising Sulphate of Ammonia, Process and Apparatus for. G. A. Phillipson, Whitwell House, Langley Moor, Durham. Application date, January 26, 1922.

In this apparatus, the neutralising and drying processes are carried out in definite stages in a series of chambers traversed in succession by the salt, and provided with heating and agitating means. The apparatus is composed of superposed sections A, forming compartments B^1, B^2, B^3, B^4.

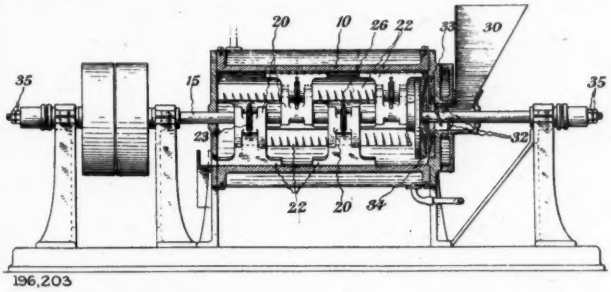


196,115

The sulphate is fed through a rotating cylinder E, divided into sections so that it forms an air lock, and is delivered to the centre of the shelf G^1. This shelf is provided with peripheral openings J^1 at opposite ends of the diameter, to discharge the material to the next shelf G^2, which is provided with a central opening J^2. The shelf G^3 is provided with peripheral openings J^3 and the shelf G^4 with a central opening J^4, leading to the discharge shoot K. Each tray is provided with recesses H which are connected with one another in series, and supplied with steam to heat and dry the salt on the trays. Ammonia is supplied to each compartment to neutralise the salt, and an outlet for gas is also provided. The vertical shaft C carries scraping devices which sweep over the shelves to stir the salt and expose it to the gas, and also to direct it towards the openings J^1, J^2, J^3, J^4.

196,203. Crushing and Grinding Mill. F. Wriedt, 50, Broomfield Avenue, Alphington, Victoria, Australia, and Milo Machinery Co. Proprietary, Ltd., 12–13, City Baths Court, Swanston Street, Melbourne, Australia. Application date, May 29, 1922.

A horizontal grinding drum 10 is provided with a rotating shaft 15 carrying the grinding devices within the drum. The material to be ground is fed from a hopper 30 to a helical conveyor 32, which delivers it to crushing discs 33, 34 which



196,203

effect a preliminary disintegration of the material. The grinding devices consist of a number of pads 22 which are pivoted to supporting spiders 20 secured to the shaft. Each pad has a curved surface which is pressed against the inner wall of the drum by means of springs 23. If the centres of gravity of these pads are radially in line with their supporting pivots, the pressure between the pads and the casing is approximately constant at all speeds. If the pivots are so arranged that the pads tend to turn outwards under centrifugal force, the grinding pressure varies with the speed. The efficiency of the grinding action is increased by providing tapered grooves or channels 26, which may be arranged parallel to the ends of the pads, but are preferably arranged obliquely so that the material is displaced longitudinally through the drum during grinding. The pads are arranged on the shaft so that their zones of action overlap. The crushing discs 33, 34 are slightly conical, and are provided with radial ribs. The disc 34 is fixed to the shaft 15 and the disc 33 to the casing. Instead of the grinding pads 22, a series of small conical rollers may be employed, having their axes slightly inclined to the shaft so that their surfaces are in contact with the drum 10. These rollers are mounted in a similar manner to that of the pad. The temperature of the material within the drum is maintained at the desired point by the jacket 35.

Note.—Abstracts of the following specifications, which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention: 174,089 (Standard Oil Co.) relating to conversion of heavy hydrocarbon oils into lighter hydrocarbon oils, see Vol. VI, p. 396.

International Specifications not yet Accepted

194,662. Soaps. T. Legradi, 7, Loquaiplatz, Vienna. Assignee of T. Wieninger, 2, Haslangstrasse, Munich, Germany. International Convention date, March 7, 1922.

To render potash soaps more durable, any of the following treatments may be adopted: (1) Concentrating till the fatty acid content is above 75 per cent.; (2) adding 1 per cent. of potassium formate or other non-hygroscopic salt; (3) slightly overheating to cause superficial decomposition; (4) boiling and solidifying under reduced or increased pressure.

194,663. Magnesium Carbonate. A. Hambloch, Andernach-on-Rhine, Germany. International Convention date, March 8, 1922.

A mineral containing magnesium and calcium carbonates or silicates is treated, with or without previous roasting, with water, carbon dioxide and an alkali carbonate or bicarbonate at 60°-70° C. yielding a soluble magnesium-alkali carbonate or bicarbonate and an insoluble residue containing calcium carbonate, silica, alumina, and iron. The solution is

heated to 100° C. to precipitate magnesium carbonate, or if the heating is carried out *in vacuo*, the tri-hydrate is precipitated.

194,676. CRYSTALLISING. Aktieselskapet de Norske Saltverker, 71, Kong Oskarsgate, Bergen, Norway. International Convention date, March 11, 1922. Addition to 171,370. (See THE CHEMICAL AGE, Vol. VI, p. 48.)

Granular crystals are formed by circulating a supersaturated solution downwards through a mass of crystals supported on a gauze diaphragm and agitated by rotating arms, or alternatively, the crystals may be contained in a rotating wire gauze drum.

194,693. ALKALI CELLULOSE; VISCOSE. A. Pinel, 69, Rue Crevier, Rouen, France. International Convention date, March 7, 1922.

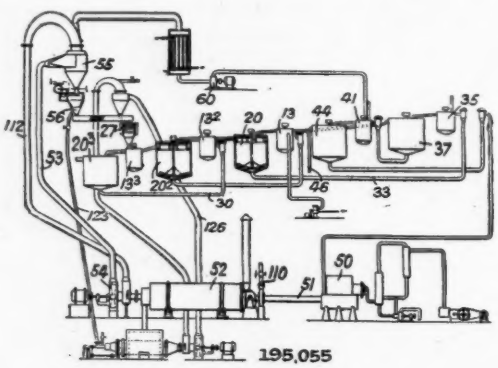
Alkali cellulose is agitated and heated to 50°-60° C. for 2-3 hours in a rotary, jacketed drum, to accelerate the ripening action. The product is then cooled by means of cold water, and converted into viscose, which gives a higher yield when converted into artificial silk.

194,694. PARA-AMINOPHENOL. G. Poma, Cesano Maderno, Milan, Italy. International Convention date, March 9, 1922.

An alkaline solution of phenol is treated with a diazo compound from a primary aromatic amine, such as benzidine, toluidine, α- or β-naphthylamine, and the resulting azo body is reduced with hydrogen in the presence of a catalyst such as finely-divided nickel, cobalt, copper, iron, or their oxides. The base is recovered by filtering or by adding sodium sulphate or sulphuric acid in the case of benzidine or toluidine and *p*-aminophenol is isolated from the solution.

195,055. REFINING OILS AND WAXES. Silica Gel. Corporation, 239, Redwood Street, Baltimore, Md., U.S.A. Assignees of W. A. Patrick, The Terraces, Mount Washington, Baltimore, Md., U.S.A., and F. B. Miller, 239, Redwood Street, Baltimore, Md., U.S.A. International Convention date, March 16, 1922.

Oils and waxes, benzene, toluene, carbon tetrachloride and aniline are purified by means of a very fine porous material, such as the silica gel described in specification 136,543 (see THE CHEMICAL AGE, Vol. II, p. 210) or activated charcoal, or gels of the oxides of iron, tin, aluminium, tungsten, zirconium and titanium. The crude liquid is passed through or mixed with the absorbent and the absorbed material is liberated by solution in water, by distilling, or by steam treatment. In an example, crude petroleum passes through a series of agitators



195,055

13, 13^2, 13^3, and separators 20, 20^2, 20^3. The fresh absorbent is supplied from a hopper 27 to the last absorber 13^3 and separator 20^3, and then passes to the other absorbers and separators. The absorbent then passes to a series of agitators 35, 41, and separators 37, 44 for treatment with cold and hot water to separate petroleum and high boiling impurities. The absorbent then passes to a filter press 50, and then to a chamber 52, which is heated by hot gases passing through transverse tubes. The residual absorbed material is thus distilled off, and the dry absorbent passes to a cyclone separator 55 and thence to the hoppers 56, 27, for use again.

194,727. NITROCELLULOSE, TREATING. R. G. Woodbridge, 2407, West Seventeenth Street, Wilmington, Del., U.S.A. International Convention date, March 13, 1922.

Nitrocellulose powder is heated to 60°–135° C. with a non-solvent organic liquid, such as ethyl, propyl or butyl, alcohol, toluene, benzene or xylene. The temperature is preferably the boiling point of the liquid used. The product yields solutions of much lower viscosity than the original nitrocellulose, which may be used as coating compositions. The diphenylamine present as a stabiliser may be extracted from the nitrocellulose, yielding a light-coloured product.

LATEST NOTIFICATIONS.

197,315. Manufacture of ethyl alcohol from sulphovinic acid. Compagnie de Béthune Soc. Anon. May 4, 1922.

197,319. Processes of oxidising dibenzyl. Carbide and Carbon Chemicals Corporation. May 4, 1922.

197,329. Process for neutralising the hydrochloric acid and for dissolving the organic chlorides formed by the chlorination of cellulosic materials with a view to obtaining cellulose. A. R. de Vains. May 3, 1922.

197,341. Apparatus for condensing distilled vapours. C. de Béthune. May 8, 1922.

Specifications Accepted, with Date of Application

172,302. Carbonaceous and other materials, Treatment of. F Frank. December 1, 1920.

174,618. Metals or alloys poor in carbon and silicon, Process for the manufacture of, in electric furnaces. Aktiebolaget Ferrolegeringar. January 29, 1921.

174,635. Chlorination of acetylene, Method for. Holzverkonlungs Industrie Akt.-Ges. January 29, 1921.

177,494. Synthesis of ammonia by means of hyper-pressures. Soc. Chimique de la Grande-Paroisse (Azote et Produits Chimiques). March 25, 1921.

184,442. Artificial resins, Process for improving. Consortium für Elektrochemische Industrie Ges. Aug. 12, 1921. Addition to 182,459.

191,002. Butyl chlorides, Manufacture of. Soc. Ricard Ahlenct et Cie. Dec. 28, 1921.

196,641. Cellulose acetates. J. O. Zdanowich. November 22, 1921.

196,646. Vapours from gases, Means for removing and recovering. J. Crosfield and Sons, Ltd., and H. J. Wheaton. November 29, 1921.

196,658. Chemical reactions and physical processes, Process and furnaces for carrying out, at high temperatures. H. Mehner. January 17, 1922.

196,672. Amido-phenol compounds. O. King. January 24, 1922.

196,680. De-sulphurising mineral oils and spirits, Method of and means for. A. C. Nesfield. January 25, 1922.

196,708. Bleaching liquor from chlorine gas, Process for rapid production of. J. Brandwood, T. Brandwood, and J. Brandwood. February 2, 1922.

196,746. Mixtures of organic solvents, Process for separating extracts from. H. Bollmann. February 17, 1922.

196,839. Detergents and bleaching agents, Manufacture of. Deutsche Gold-und-Silber-Scheideanstalt vorm. Roessler and O. Liebknecht. June 6, 1922.

Applications for Patents

Aktieselskabet Dansk Svovlsyre- and Superphosphat-Fabrik and Dansk Aktieselskal Siemens-Schuckert. Manufacture of sulphuric acid. 12660. May 11. (Denmark, June 9, 1922.)

Becco Engineering and Chemical Co., Ltd. Combined water softening and filtration plant. 12669. May 11.

Chemische Werke vorm. Auerges. Method of rendering enamel opaque. 12621. May 10. (Germany, May 18, 1922.)

Goedecke, C. E. J., and Kochelwerk Ges. für Chemische Erzeugnisse. Process for dissolving dye-stuffs and production of body colours. 12713. May 11.

Heyl, G. E. Obtaining sulphur-free oil from oil shale, etc. 12214. May 7.

Hunter, W. Recovery of caustic alkali used in digesting cellulosic etc., material and simultaneous production of oxalic acid. 12502. May 9.

Jackson, W. J. Mellersh-, and New Jersey Zinc Co. Manufacture of zinc oxide. 12366. May 8.

Naamlooze Vennootschap Philips' Gloeilampenfabrieken and Wade, H. Process of separating zirconium and hafnium. 12499. 12500. May 9.

Pereira, H. Process for manufacturing a dye from dioxyperylene. 12382. May 8. (Austria, May 18, 1922.)

Soc. d'Études Chimiques pour l'Industrie. Manufacture of manures from cyanamide. 12686. May 11. (Switzerland, May 15, 1922.)

Soc. of Chemical Industry in Basle. Manufacture of dye-stuffs of indigo tint. 12469. May 9. (France, March 30.)

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to* THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, May 17, 1923.

TRADE has been rather slow during the past week, and there is really no special feature. Prices are firm, and stocks of most chemicals are on the low side.

There is some export inquiry, but the business maturing is very unsatisfactory.

General Chemicals

ACETONE is in steady demand with price unchanged.
ACID ACETIC is again higher in price and in active demand.
ACID CITRIC is quiet but very firm.
ACID FORMIC is unchanged.
ACID OXALIC in fair request with price a little harder.
ACID TARTARIC.—Demand is slow for the moment, but manufacturers are still looking for higher prices.
ARSENIC is without special feature.
BARIUM CHLORIDE is weak and in very poor demand.
CREAM OF TARTAR is firm and active; stocks are very short.
FORMALDEHYDE is very firm in price, and little is available in any position.
LEAD ACETATE is again dearer and in good demand.
BROWN SUGAR LEAD.—Price has reached the same level as White, and little is obtainable.
METHYL ALCOHOL is unchanged.
POTASSIUM CARBONATE and POTASSIUM CAUSTIC are without special feature.
POTASSIUM PERMANGANATE is a little easier in tone.
POTASSIUM PRUSSIATE is lower in price, owing to the absence of demand.
SODIUM ACETATE is a rising market; makers are well sold for the remainder of the year.
SODIUM BICHROMATE is in demand for spot delivery. American makers are fully occupied in their own market.
SODIUM HYPOSULPHITE is unchanged.
SODIUM NITRITE is stagnant.
SODIUM PHOSPHATE.—No change.
SODIUM PRUSSIATE is lower, with no export inquiries.
SODIUM SULPHIDE.—There is considerable competition, and the tendency is in buyers' favour.
ZINC OXIDE is rather lower in price.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID has again been in demand; market firm.
ACETANILID is unchanged.
ACID SALICYLIC is in good request, available supplies finding a ready sale.
AMIDOPYRIN is a slow market, export demand having fallen off somewhat.
BARBITONE is in short supply.
BROMIDES.—Prices are shaded somewhat by sellers of isolated parcels. The forward position, however, remains firm.
HEXAMINE is easier on the spot.
PHENAZONE is unchanged.
PHENOLPHTHALEIN is firm and appears likely to advance.
SODA SALICYLATE is in good request, the higher prices now being freely paid for the best brands.
SODA BENZOATE is firm.
VANILLIN is unchanged.

Coal Tar Intermediates

There are no outstanding features to report in this market, but business continues to progress on quiet and steady lines.
ALPHA NAPHTHOL is firm, with good inquiry in the market.
ALPHA NAPHTHYLAMINE.—Some small home orders have been booked.
ANILINE OIL AND SALT continue without change in price.
BENZALDEHYDE has been the object of some export interest.
BENZIDINE BASE.—Home inquiries have been received.
BETA NAPHTHOL is inquired for on export account.
DIANISIDINE.—Both home and export inquiries are in the market.
DIMETHYLANILINE.—Some fair business has been placed.
DINITROCHLORBENZOL.—Foreign buyers are interested.
DIPHENYLAMINE is firm and in demand.
METANITRANILINE.—Home business is reported.
NAPHTHIONIC ACID has been a small trade for home consumption.
PARANITRANILINE is featureless.
RESORCINE.—Some export inquiry is reported.

Coal Tar Products

There is little material change in the position of our market from last week. The demand remains fairly steady, and prices are well maintained.

90% BENZOL has a slightly better inquiry, and is quoted at 1s. 7d. per gallon on rails.
PURE BENZOL is steady at 2s. 1d. per gallon on rails in the North and 2s. 4d. to 2s. 5d. per gallon in the South.
CREOSOTE OIL is firm at 8¼d. per gallon on rails in the North and 9d. per gallon in the South.
CRESYLIC ACID is quietly firm at 2s. 2d. per gallon on rails for the pale quality, 97/99%, while the dark quality, 95/97%, is quoted at 1s. 10d. to 1s. 11d. per gallon.
SOLVENT NAPHTHA has a poor inquiry and is worth about 1s. 4d. per gallon on rails.
HEAVY NAPHTHA is slightly better for near delivery, and is worth about 1s. 6d. per gallon.
NAPHTHALENE is easier, the better qualities being worth about £13 to £14 per ton, while the lower melting points are worth £8 to £9 10s. per ton.
PITCH remains quiet, and prices still have a downward tendency. To-day's values are:—155s. to 160s. per ton, f.o.b. London; 150s. to 155s. per ton, f.o.b. East Coast port; 145s. to 150s. per ton, f.o.b. West Coast port.

Sulphate of Ammonia

The export demand for autumn shipment is improving. To-day's value is approximately £15 10s. to £16 per ton, f.o.b.

[Current Market Prices on following pages.]

Pease and Partners, Ltd.

AT the annual general meeting of the shareholders of Pease and Partners, Ltd., held on Wednesday at Darlington, Sir Arthur F. Pease (the chairman) presided and, in moving the adoption of the report and accounts, said: "I may congratulate this company on having pulled through one of the most difficult periods that has ever been experienced in its history. Only those behind the scenes have realised how desperate the position has been. From time to time in the different departments we have only managed to hold our own by the closest attention to every detail, where saving could be effected, and by the loyalty and devotion of the staff, and, I am glad to say, in many instances, though not in all, by the co-operation of the workmen. Even before the temporary increase in prices directly traceable to the Ruhr position trade generally was getting on to a much sounder basis than what it had been for many months previously."

A final dividend of 4 per cent. was declared, making, with the interim dividend, 6 per cent., free of tax, for the year.

Referring to Skinningrove, Sir Arthur Pease said that they were holders of one-quarter of the share capital, together with a large block of debentures. At the time war broke out Skinningrove had only just begun to make steel, and as a consequence they were harder hit than any firm he knew of by the Excess Profits Act, as their standard had to be on a percentage basis, and for other reasons the Skinningrove Company was unable to carry on during the very difficult times which followed the coal strike without additional capital.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	5	to	0	1	6
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	121	0	0	to	125	0	0
Acid, Acetic, glacial, 99–100%	ton	69	0	0	to	70	0	0
Acetic, 80% pure	ton	50	0	0	to	51	0	0
Acetic, 40% pure	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g.	ton	100	0	0	to	105	0	0
Boric, commercial	ton	50	0	0	to	55	0	0
Carbolic, cryst. 39–40%	lb.	0	1	8	to	0	1	9
Citric	lb.	0	1	10	to	0	1	10½
Formic, 80%	ton	52	10	0	to	53	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	41	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	44	0	0
Nitric, 80 Tw.	ton	27	0	0	to	28	0	0
Oxalic	lb.	0	0	6½	to	0	0	6¾
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, Technical	lb.	0	1	9	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	5	to	0	1	5½
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	lb.	0	0	4	to	0	0	4¼
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	35	0	0	to	37	10	0
Nitrate (pure)	ton	35	0	0	to	40	0	0
Phosphate	ton	68	0	0	to	70	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white powdered	ton	75	0	0	to	78	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	17	0	0	to	17	10	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	1	0	to	0	1	1
Bleaching powder, 35–37%	ton	10	10	0	to	11	0	0
Borax crystals	ton	28	0	0	to	32	0	0
Calcium acetate, Brown	ton	11	10	0	to	12	0	0
Grey	ton	19	15	0	to	20	0	0
Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	0	0	to	7	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	100	0	0	to	105	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	2	to	0	1	3
Sulphate	ton	27	0	0	to	28	0	0
Cream Tartar, 98–100%	ton	97	10	0	to	100	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	92	10	0	to	95	0	0
Formusol (Rongalite)	lb.	0	2	1	to	0	2	2
Glauber slats, commercial	ton	5	0	0	to	5	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols	gal	0	2	2	to	0	2	3
Iron perchloride	ton	28	0	0	to	30	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	43	0	0	to	45	0	0
Carbonate (White Lead)	ton	45	0	0	to	48	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	45	0	0	to	46	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	4	15	0	to	5	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	6	10	0	to	7	0	0
Sulphate (Druggists')	ton	10	0	0	to	11	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	58	0	0	to	60	0	0
Methyl acetone	ton	78	0	0	to	80	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	40	0	0	to	41	0	0
Ammonium sulphate, double salt	ton	40	0	0	to	41	0	0
Potash, Caustic	ton	35	0	0	to	36	0	0
Potassium bichromate	lb.	0	0	5¾	to	0	0	6
Carbonate, 90%	ton	31	0	0	to	32	0	0
Chloride, 80%	ton	9	10	0	to	10	10	0
Chlorate	lb.	0	0	4½	to	0	0	4¾
Metabisulphite, 50–52%	ton	80	0	0	to	85	0	0
Nitrate, refined	ton	43	0	0	to	45	0	0
Permanganate	lb.	0	0	10½	to	0	0	11
Prussiate, red	lb.	0	3	6	to	0	4	0
Prussiate, yellow	lb.	0	1	4½	to	0	1	5
Sulphate, 90%	ton	10	10	0	to	11	0	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	24	15	0	to	25	0	
Arsenate, 45%	ton	48	0	0	to	50	0	
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4¾
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3½	to	0	0	3¾
Caustic, 70%	ton	19	10	0	to	20	0	0
Caustic, 76%	ton	20	10	0	to	21	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	28	0	0	to	29	0	0
Phosphate, crystal	ton	16	10	0	to	17	0	0
Perborate	lb.	0	1	0	to	0	1	1
Prussiate	lb.	0	0	8	to	0	0	8½
Sulphide, crystals	ton	10	10	0	to	11	0	0
Sulphide, solid, 60–62 %	ton	16	10	0	to	17	10	0
Sulphite, cryst.	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	40	0	0	to	42	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	10	0	to	12	10	0
Roll	ton	11	0	0	to	12	0	0
Tartar emetic	lb.	0	1	2	to	0	1	3
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	40	0	0	to	42	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	16	0	0	to	17	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	3	to	0	3	6
Acetanilid	lb.	0	1	6	to	0	1	9
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	6	to	0	3	0
Salicylic, B.P.	lb.	0	2	2	to	0	2	6
Tannic, leviss	lb.	0	3	4	to	0	3	6
Amidol	lb.	0	8	3	to	0	8	6
Amidopyrin	lb.	0	13	3	to	0	13	6
Ammon ichthosulphonate	lb	0	2	0	to	0	2	3
Barbitone	lb.	0	18	6	to	0	19	6
Beta naphthol resublimed	lb	0	1	9	to	0	2	0
Bromide of ammonia	lb.	0	0	9	to	0	0	10
Potash	lb.	0	0	8½	to	0	0	9
Soda	lb.	0	0	9	to	0	0	9½
Caffeine, pure	lb.	0	12	0	to	0	12	3
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	4	9	to	0	5	0
Chloral hydrate	lb.	0	3	10½	to	0	4	0
Cocaine alkaloid	oz.	0	18	0	to	0	18	6
Hydrochloride	oz.	0	14	9	to	0	15	0
Corrosive sublimate	lb.	0	4	3	to	0	4	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	1	6	to	0	1	6½
B.P. (75–80% eucalyptol)	lb.	0	1	7	to	0	1	7½
Guaiacol carbonate	lb.	0	8	6	to	0	8	9
Liquid	lb.	0	9	6	to	0	10	0
Pure crystals	lb.	0	10	3	to	0	10	6
Hexamine	lb.	0	4	0	to	0	4	3
Hydroquinone	lb.	0	3	6	to	0	3	9
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	18	6	to	1	0	0
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	6	to	0	2	10
Metol	lb.	0	10	6	to	0	11	6
Milk sugar	cwt.	4	10	0	to	4	12	6
Paraldehyde	lb.	0	1	6	to	0	1	9
Phenacetin	lb.	0	6	3	to	0	6	9
Phenazone	lb.	0	7	9	to	0	8	0
Phenolphthalein	lb.	0	5	6	to	0	5	9
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3			—	

	Per	£	s.	d.		£	s.	d.
Resorcine, medicinal	lb.	0	5	6	to	0	5	9
Salicylate of soda powder	lb.	0	2	6	to	0	2	9
Crystals	lb.	0	2	9	to	0	3	0
Salol	lb.	0	2	9	to	0	3	0
Soda Benzoate	lb.	0	2	3	to	0	2	6
Sulphonal	lb.	0	14	6	to	0	15	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	6
Soda salicylate	lb.	0	7	9	to	0	8	3
Vanillin	lb.	1	3	6	to	1	4	6

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9½	to	0	0	10
Salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	0	to	0	3	3
Benzidine, base	lb.	0	5	0	to	0	5	3
Sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	7	to	0	1	9
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	9	to	0	4	0
H-Acid	lb.	0	5	0	to	0	5	3
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	2	3	to	0	2	6
Naphthionate of Soda	lb.	0	2	6	to	0	2	9
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nevill Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	8	to	0	0	8
Nitronaphthalene	lb.	0	1	0	to	0	1	1
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	9	to	0	6	3
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/10 spot	0	2	0
Bay		0	12	0
Bergamot		0	12	0
Cajaput		0	3	9
Camphor, white	per cwt.	4	0	0
Brown	„	3	15	0
Cassia	firmer, c.i.f. 7/9 spot	0	8	6
Cedarwood		0	1	6
Citronella (Ceylon)		0	3	2
(Java)	but forward quotations are easier	0	4	0
Clove	easier	0	7	6
Eucalyptus	dearer and very firm	0	1	8
Geranium Bourbon	firm	1	10	0
Lavender	very firm	0	12	6
Lavender spike		0	3	0
Lemon		0	3	0
Lemongrass	dull per oz.	0	0	2½
Lime (distilled)	very firm	0	3	6
Orange sweet (Sicilian)		0	11	0
(West Indian)		0	10	0
Palmarosa	very firm	0	17	6
Peppermint (American)		0	13	0
Mint (dementholised Japanese)		0	6	6
Patchouli		1	12	0
Otto of Rose	per oz.	1	4	0
Rosemary		0	1	8
Sandalwood		1	6	0
Sassafras		0	5	0
Thyme	as to quality 2/6 to	0	8	0
Synthetics.				
Benzyl acetate		0	3	0
Benzoate		0	3	0
Citral		0	10	0
Coumarine	firm	0	16	0
Heliotropine	firm	0	7	6
Ionone		1	5	0
Linalyl acetate		1	2	6
Methyl salicylate		0	2	6
Musk xylol		0	9	0
Terpeniol		0	3	1

New Results in the Use of Insulin

Two interesting facts have emerged during the first trials in this country of insulin, the new remedy for diabetes. One of these, which comes from the Biochemical Laboratory at Cambridge (Winter and Smith: *British Medical Journal*), is that "a substance similar to insulin may be obtained from yeast." Cases of diabetes were rendered sugar free by this substance, and "of the seven cases examined five showed marked improvement." It is thus possible that the yeast-plant contains an active principle similar to that of pancreatic insulin. The value of yeast in the treatment of boils, which are common in diabetes, has often been commented on.

The other fact is that insulin can be introduced into the blood stream by means of inunction, or rubbing into the skin (Telfer Institute of Physiology, Glasgow: *B.M.J.*). This method, however, "necessitates the use of much larger quantities of the drug than those required to produce comparable effects by subcutaneous injection." On the other hand, the skin method affords a more prolonged and gentle action, and possibly may be helpful in utilising crude products unsuitable for injection.

Generally speaking, the experiences with insulin have been most satisfactory, and have confirmed those of the Canadian and American workers. The new drug is being studied with great interest by biochemists, who are observing its effects on the utilisation of sugar by the human tissues. A new field of research is thus being opened up.

Contamination of Bottled Chemicals

In his Quarterly Report, Mr. J. F. Liverseege, city analyst of Birmingham, refers to a case heard by the magistrates in April in which it was stated that potassium carbonate, which was a hygroscopic substance and absorbed moisture, had derived lead and arsenic from the glass bottle in which it was contained. The drug contained 10 parts arsenic and 80 parts of lead per million and 17.9 per cent. of moisture. Since the case he has proved that wet potassium carbonate will remove lead from glass containing it. It seemed probable that previous samples of potassium carbonate had acted on the glass and formed a coating of lead-contaminated potassium carbonate on the interior surface of the bottle, and that when the bottle was filled up with the last sample this lead-contaminated potassium carbonate mixed with the pure drug, and so accounted for the large proportion of lead present in the drug. Experiments are at present in progress to ascertain if potassium carbonate complying with the British Pharmacopeia requirements as to the amount of moisture has any action on glass containing lead.

The Pasteur Centenary

The celebrations in France of the Centenary of Pasteur began in Paris on Thursday, when the foreign delegates were received by M. Millerand, the President of the Republic, at the Elysée. On the Friday morning the Pasteur Institute and the tomb of the great scientist were visited, and in the afternoon a ceremony, over which M. Millerand presided, took place in the Sorbonne. Various other functions are arranged until Tuesday, and on the following day the delegates will travel to Strassbourg, where, on Thursday, May 31, the monument to Pasteur will be unveiled.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, May 16th, 1923.

THERE has been no appreciable change in the position of the heavy chemical market during the past week.

Spot lots of Continental materials continue scarce, and prices consequently well maintained.

Inquiries in circulation are mostly for export and a moderate number of orders have been booked.

Industrial Chemicals

ACID, ACETIC.—Glacial, 98/100%, £61 to £67 per ton; 80% pure, £47 to £48 per ton; 80% technical, £46 to £47 per ton; c.i.f. U.K., duty free.

ACID, BORACIC.—Crystal or granulated, £50 per ton; powdered, £52 per ton—carriage paid U.K. stations.

ACID CITRIC.—Unchanged at about 1s. 10d. per lb. spot or forward delivery.

ACID, FORMIC 80%.—Offered at about £51 per ton, f.o.r. works.

ACID, HYDROCHLORIC.—Price remains unchanged, 6s. 6d. per carboy, ex works.

ACID, NITRIC 84°.—£27 10s. per ton; ex station, full truck loads.

ACID, OXALIC.—In little demand, about 6½d. per lb., ex store.

ACID, SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, £1 per ton extra.

ACID, TARTARIC.—Inclined to be higher at 1s. 3d. per lb., ex wharf.

ALUM, LUMP POTASH.—Spot lots, about £12 10s. per ton, ex store. Quoted £11 10s. f.o.b. U.K. for export.

ALUMINA, SULPHATE.—17/18% iron free, about £10 to £10 5s. per ton, ex store.

AMMONIA, ANHYDROUS.—Unchanged at 1s. 6d. per lb., ex station.

AMMONIA, CARBONATE.—Lump, 4d. per lb.; ground, 4¼d. per lb., delivered.

AMMONIA, LIQUID 880°.—About 3½d. per lb., ex station, package extra.

AMMONIA, MURIATE.—Grey galvanisers' quality offered at £32 to £33 per ton.

AMMONIA, SALAMONIAC.—Fine white crystals offered at £27 10s. per ton, ex wharf, early delivery.

AMMONIA, SULPHATE.—25¼%, £15 10s. per ton; 25¾% neutral, £16 13s. per ton, ex works. May delivery.

ARSENIC, WHITE POWDERED.—Remains steady at about £76 to £77 per ton.

BARIUM CHLORIDE.—98/100%. Offered from Continent at £14 10s. per ton, c.i.f. U.K.

BARYTES.—Powdered, finest white, £5 5s. per ton, ex works.

BLEACHING POWDER.—£11 7s. 6d. per ton, ex station, spot delivery. Contracts 20s. per ton less.

BORAX.—Crystal or powdered, £28 per ton; powdered, £29 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English material, £5 12s. 6d. per ton, ex quay or station. Continental material offered at £4 17s. 6d. per ton, c.i.f. U.K.

COPPERAS, GREEN.—Quoted £2 10s. to £2 15s. per ton, f.o.b. U.K.

FORMALDEHYDE, 40%.—Now quoted £89 to £90 per ton, ex wharf.

GLAUBER SALTS.—Fine white crystals, £3 17s. 6d. per ton, ex store.

LEAD, RED.—English makers' price, £41 per ton, carriage paid U.K. stations. Continental material offered at £34 per ton, c.i.f.

LEAD ACETATE.—White crystals now quoted £42 to £43 per ton, ex store.

LEAD NITRATE.—Offered at £39 per ton, c.i.f. U.K.

MAGNESITE.—English burnt material, £8 10s. per ton; Continental, about £7 10s. per ton, c.i.f. U.K.

MAGNESIUM CHLORIDE.—Offered at £3 5s. per ton, ex store, spot delivery.

MAGNESIUM SULPHATE (Epsom salts).—Commercial crystals, £7 per ton; B.P., £8 10s. per ton, delivered; B.P. for export quoted £6 10s. per ton, f.o.b. U.K.

POTASH, CAUSTIC 88/92%.—Quoted £34 per ton, ex store, spot delivery.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM, CARBONATE.—96/98%, £34 to £35 per ton; 90/92%, £29 to £30 per ton, ex store, spot delivery.

POTASSIUM CHLORATE.—Crystals or powder at 3d. per lb, ex store.

POTASSIUM NITRATE (Saltpetre).—Nominally £32 per ton, ex store; little inquiry.

POTASSIUM PERMANGANATE.—Commercial, 10½d. per lb.; B.P., about 11½d. per lb.

POTASSIUM PRUSSIATE (Yellow).—Offered at 1s. 4½d. per lb. ex station.

SODA, CAUSTIC.—76/77%, £21 7s. 6d. per ton; 70/72%, £19 17s. 6d. per ton; 60/62%, broken, £21 2s. 6d. per ton; 98/99%, powdered, £24 15s. per ton, ex station, spot delivery.

SODIUM ACETATE.—Quoted £24 10s. per ton, ex wharf, early delivery.

SODIUM BICABONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; alkali 58%, £8 16s. per ton, ex quay or station, spot delivery.

SODIUM CHLORATE.—Price about 2¾d. to 3d. per lb.

SODIUM HYPOSULPHITE.—Commercial crystals, about £10 7s. 6d. per ton; pea crystals, £15 10s. per ton, ex station.

SODIUM NITRATE.—Refined, 96/98%, £13 10s. per ton, f.o.r. or f.o.b. U.K.

SODIUM NITRITE 100%.—Unchanged, £27 to £29 per ton, according to quantity.

SODIUM PRUSSIATE (Yellow).—In little demand. Quoted 8d. per lb, ex store.

SODIUM SULPHATE (Saltcake 95%).—£4 per ton, carriage paid station for home consumption. Higher prices for export.

SODIUM SULPHIDE.—60/62% solid, about £15 10s. per ton; 60/62% broken, £16 10s. per ton, ex store.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN.—Crystals, unchanged at 1s. 4d. per lb.

ZINC SULPHATE.—White commercial, £14 per ton.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Large inquiry from abroad. Price quoted, 1s. 6½d. per lb. f.o.b.

AMIDO AZO BENZOL.—Home inquiry. Price quoted, 3s. per lb., carriage paid.

ANTHRANILIC ACID.—Home inquiry. Price 10s. per lb., carriage paid, casks included.

BENZIDINE BASE, or SULPHATE.—In strong demand. Price quoted, 6s. 6d. per lb. 100% basis, carriage paid.

BENZYL CHLORIDE.—Small home inquiry. Price 1s. 10d. per lb. delivered.

BETA NAPHTHOL.—Large home inquiries. Price 1s. 1d. per lb. delivered.

CLEVES ACID.—Home inquiry. Price quoted, 4s. per lb. 100% bases.

DIMETHYLANILINE.—Good export demand. Price 3s. per lb. f.o.b., drums included.

J. ACID.—Small home demand. Price 15s. per lb.

PARANITRANILINE.—Good demand. Quoted at 2s. 7d. per lb. delivered.

SODIUM NAPHTHIONATE.—Home inquiries. Price 2s. 8¾d. per lb. 100% basis, carriage paid.

Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, May 17, 1923.

THERE has been little change during the past week in the position of the chemical market here. On the whole, business may be described as quietly steady on home account, transactions relating chiefly to small-sized parcels of the basic products. With minor exceptions prices have kept up fully at the level of recent weeks, firmness characterising nearly every section of the market. On the export side a fair amount of business has been done, principally on account of Colonial markets, Continental trade being quiet.

Heavy Chemicals

A satisfactory demand for caustic soda, both for home consumption and for shipment, is being met with, prices for the former being firm at from £19 for 60 per cent. to £21 10s. per ton for 76–77 per cent. material. Bleaching powder is in steady inquiry at £11 7s. 6d. per ton. Soda crystals are fairly active and unchanged in price at £5 5s. per ton delivered. Saltcake is only in quiet demand for home users, but good business is still being done for export at firm prices. Sodium sulphide is quiet at £15 per ton for 60–65 per cent. concentrated solid, and £9 for crystals. Glauber salts are also quiet again, but the price is unchanged at £4 per ton. Bicarbonate of soda is steady and in fair inquiry at £10 10s. per ton delivered to home users. Alkali is in steady demand for home and foreign buyers; 58 per cent. material is firm at £7 12s. 6d. per ton to home users. Hyposulphite of soda is still inactive at £15 per ton for photographic crystals and £10 for commercial. Nitrate of soda is steady at £26 10s. per ton, and meets with rather a better demand. Phosphate of soda keeps dull, but the price is about unchanged at £15 per ton. Chlorate of soda meets with an improved demand at 2¾d. per lb. Prussiate of soda is quiet at 8d. per lb. Bichromate of soda is steady and in fair inquiry at 4½d. per lb. Acetate of soda is still quoted at £24 per ton, without, however, any expansion in demand.

Caustic potash keeps firm at £33 to £34 per ton for 88–90 per cent., offers meeting with a ready sale. Carbonate of potash is dearer at £34 per ton for 96–98 per cent. material, and £29 for 88–92 per cent. Bichromate of potash is firm and in steady inquiry at 5¾d. per lb. Yellow prussiate of potash is easier at 1s. 4½d. per lb., little buying interest being shown. Chlorate of potash is in fairly good demand at 3¼d. per lb. Permanganate of potash is firm at 9¾d. to 10d. per lb.

A rather improved export demand for sulphate of copper is reported at £26 to £26 10s. per ton, f.o.b. Arsenic is quiet for the home trade, but still fairly active on foreign account; quotations continue round £75 per ton for white powdered, Cornish makes, though a shade less than this figure is now mentioned in some quarters. Commercial Epsom salts are in steady demand at about £4 10s. per ton for foreign and £6 10s. for British makes; magnesium sulphate, B.P., is about unchanged at £7. Acetate of lime is firm and in short supply at £20 for grey and £10 10s. per ton for brown. Nitrate of lead is still quiet at £43 10s. per ton. White sugar of lead is firm at £43 per ton, with brown at £41 to £42.

Acids and Tar Products

Tartaric acid is being steadily called for at 1s. 4d. per lb Citric acid, B.P. crystals, is firm and in good demand at 1s. 9½d. per lb. Acetic acid is in moderate inquiry at round £70 for glacial and £47 per ton for 80 per cent. technical. Oxalic acid is quiet and easier at about 6¼d. per lb.

In the coal-tar products section most lines are easier. Pitch is now quoted at £7 or less per ton on a much reduced demand for export. Carbolic acid crystals are inactive at about 1s. 5d. per lb., with crude, 60 per cent., still quoted at 3s. 8d. per gallon. Benzol is quiet at 1s. 7d. to 1s. 8d. per gallon. Solvent naphtha is now quoted at 1s. 6d. to 1s. 7d. per gallon on a much subdued demand. Creosote oil is fairly active at 9d. per gallon. Flake naphthalene is dearer again at £21 to £22 per ton, with crude at from £7 to £13, the demand being good and supplies not excessive.

German Potash and Nitrogen

THE Commercial Secretary at Berlin (Mr. J. W. F. Thelwall) has forwarded to the Department of Overseas Trade an extract from the *Berliner Tageblatt* of recent date which states that the German Potash Syndicate has issued to its customers a circular communication which, after referring to the recent fall of the mark and to the increased expenses of the industry in consequence of the dropping of shifts, states that the position of the potash industry is so uncertain that it is impossible to form any reliable opinion as to future costs of production. If, in spite of this, the Syndicate place at the disposal of agriculture 50,000 tons of pure potash (K_2O) with a 15 per cent. reduction for May on the present potash prices, this will be done in order, on the one hand, to meet agriculture as far as possible in accordance with the Syndicate's promise of April 5, and, on the other hand, in the definite anticipation that the export duty on potash salts will be removed. The reduction is as follows:—

	Marks
For 15 tons carnallite	48,292·20
For 15 tons Kainite hard salts	77,319·90
For 15 tons potash fertilising salts, 20 per cent.	191,097·00
For 15 tons ditto, 30 per cent.	355,819·50
For 15 tons ditto, 40 per cent.	611,010·00
For 15 tons chloride of potassium, 50 per cent.	833,760·00
For 15 tons sulphate of potash, 26 per cent.	824,539·95

In addition, for potash salts for inland consumption there is a freight reduction of another 10 pef cent. sanctioned by the Ministry of Transport for May and June.

As regards the distribution of the 50,000 tons K_2O, half is for agriculture and half for the trade.

The reduction on June prices will be announced in the second half of May.

A later extract from the same journal, dealing with nitrogen, reports that production and despatch in non-occupied territory were normal in April, but were hampered in occupied territories. The price reductions which were introduced on April 3 and maintained throughout the month improved sales, particularly in the second half of the month when the mark began to fall. This is explained by the fact that at the end of April the German inland price was only slightly more than half the world's market price for Chile saltpetre. The maximum prices for nitrogen fixed for the first half of May do not yet take into account the money depreciation which has occurred. The prices are for all goods contracted for up to May 15 inclusive, provided payment has been received by the Syndicate by this date, and are as follows: Sulphate of ammonia, not dried and ground, dried and ground; hydrochloride of ammonia; sulphate of ammonia and saltpetre; potassium nitrate of ammonia, loose, Mk. 6,500 per kg. nitrogen.

In addition, the potash contents are calculated according to the official prices of potash in chloride of potassium at the time of loading.

	Per kg. nitrogen
Nitrate of soda, loose	Mk. 7,800
Nitrate of lime, in paper sacks	Mk. 5,700

A Use for Titanium White

A REPORT on titanium recently issued by the Mines Board of the Canadian Department of Mines though largely devoted to the occurrences of minerals of the metal in the Dominion, states that hopes are entertained that it may be possible to develop the titanium industry in Canada by the manufacture of titanium white as a substitute for white lead and zinc white in paints. Titanium white, which is being produced commercially in Norway and the United States, is said to possess greater covering power than either white lead or zinc oxide, not to be poisonous like white lead, to be chemically inert, and, unlike zinc oxide, to exert no saponifying action on linseed oil. The pigments made in the United States are of two types, either consisting essentially of pure titanium dioxide or being composite pigments in which the dioxide is precipitated upon or with a base, or extender, pigment, such as barium sulphate. Pigments of the second type are said to be of the greater importance from the commercial point of view because of the present cost of manufacturing pure titanium oxide. The commercial titanium white pigments of Norwegian origin are also composite.

Company News

SANTA CATALINA NITRATE CO.—An interim dividend is announced at the rate of 5 per cent. (1s. per share), less tax, payable on June 18.

NORTH BROKEN HILL.—A dividend of 2s. per share, less Australian absentee tax at 7d. in the £ and British income tax, has been declared, payable on June 27.

THE LIVERPOOL NITRATE CO., LTD.—An interim dividend of 1s. per share, less tax, will be paid on May 29. The transfer books were closed on May 9 and will remain closed until May 30.

THE BRITISH COTTON AND WOOL DYERS' ASSOCIATION, LTD.—The transfer books and register of members of the Association, in respect of the ordinary shares, are closed until June 1.

BADISCHE ANILINE CO.—The gross profit of the company in 1922 totalled 3,901,410,812 marks, against 168,700,000 marks in 1921. The dividend is 300 per cent., against 30 per cent. in 1921.

WILLIAM GOSSAGE & SONS, LTD.—The transfer books of the 5 per cent. first cumulative preference shares will be closed until June 1, for the purpose of preparing and issuing dividend warrants due on that date.

NATIONAL DRUG AND CHEMICAL CO. OF CANADA.—The report for the year to January 31 last states, that after paying all trade expenses, salaries to directors and officers, providing for bad debts, as well as paying dividends, the balance left is equal to £21,615. The profit and loss account shows a trading profit of £46,986.

RAY CONSOLIDATED COPPER CO.—The report for 1922 states that the profit from operations was $221,296, to which must be added a miscellaneous revenue of $122,418, making the total income $343,714. After allowing for depreciation and shut down expenses, amounting to $776,828, there is a net loss of $433,114 to be carried to the surplus account, increasing this account to $11,388,919.

AMALGAMATED ZINC (DE BAVAY'S) CO., LTD.—The directors' report for the half-year ended December 31 last, states that the profit on working account, after transferring £6,966 to reserve for depreciation, was £38,920, and after taking into account profit and loss items, including £8,365, dividends on shares of other companies, the profit transferred to appropriation account was £39,079, from which, since the close of the half-year, the thirty-second dividend was paid.

SAN SEBASTIAN NITRATE CO.—The report for 1922 shows a net profit, after charging all costs, of £807 (against £5,881 for 1921), and £7,247 was brought in, making a total of £8,055, which the directors propose to carry forward. No nitrate was manufactured at the company's oficina during the year, and small profit was derived from the sale of nitrate stocks brought over from the preceding year. In view of the improved prospects of the industry the company's works were reopened on May 1.

EVANS, SONS, LESCHER AND WEBB, LTD.—The accounts for the past year show that a debit balance brought in from 1921 of £282,430 has been increased by £2,442 for debenture interest, plus a trading loss for 1922 of £86,382, and loss of property with reserve depreciation to the extent of £27,065. After crediting transfer fees the debit balance is £398,240. The report states that further reorganisation is proceeding, and the results for the first four months' trading of 1923 show a marked improvement.

ENGLISH CROWN SPELTER CO., LTD.—The profit for 1922 was £8,893, including £495 from refund of excess profits duty, while £771 was brought forward. After paying a dividend of 2s. per share (10 per cent.), less tax, there is a balance of £2,289 to be carried forward. Further refunds of excess profits duty were recovered, out of which £21,000 was transferred to reserve fund and suspense account to replace amount withdrawn last June, and £12,000 to dividends equalisation fund. The mines in Italy have been disposed of and a large proportion of purchase money received. Owing to the impossibility of developing mining concessions in Tunis on an economic basis, £1,550 has been written off.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. No.
Switzerland	Copper, spelter, zinc and nickel	648
Switzerland	Scientific, optical and surgical instruments, distillery and chemical plant[1]	651
Egypt	Chemicals, dyes, paints and varnishes, boiled and crude linseed oil, chrysoidine and nigrosine	653

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

SOUTH AFRICA (May 28).—Disinfectant fluid. Particulars from Department of Overseas Trade (Room 52), 35, Old Queen Street, London, S.W.1. Reference No. 11261/E.D./C.C. (2).

SOUTH AFRICA (May 28).—Raw and double boiled linseed oil. A copy of the specification, general conditions of tender, etc., may be seen at the Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1.

SOUTH AFRICA (June 4).—Tallow. Particulars from the Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1 Reference No. 11266/E.D./C.C./2.

SOUTH AFRICA (June 4).—Anti-friction grease. Particulars from the Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1. Reference No. 11265/E.D./C.C.2.

SOUTH AFRICA (June 4).—Red oxide paint in paste. A complete set of documents, comprising tender form, schedule, and general conditions, can be seen at the Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1. Reference No. 11264/E.D./C.C./2.

Recent Wills

Mr. Roland Yorke Bevan, 74, Antrim Mansions, Hampstead, a director of the Commercial Gas Co. £42,230

Mr. William Dickins Heywood, Little Onn Hall, Church Eaton, director of the Langloan Iron and Chemical Co., Ltd. £39,564

Mr. William Edward Walker, Bigrigg, Cumberland, director of the Whitehaven Hematite Iron and Steel Co., Ltd., and of the Lamplugh Iron Ore Co., Ltd., etc. £24,125

Forest Products Research in Canada

THE progress which has been made in forest products research in Canada is outlined in a recent bulletin issued by the Federal Department of Interior. This research work is being carried on at the Forest Products Laboratories at Montreal, and in addition special work is being conducted in a timber testing laboratory at Vancouver.

The work of the Montreal laboratories is divided into four main divisions—namely, pulp and paper, timber physics, timber tests, and wood preservation.

The pulp and paper division has made detailed studies of the chemistry of Canadian woods in relation to pulp manufacture. Technical processes in the heating of pulp have been investigated. In the manufacture of sulphite pulp, experiments have been made in the penetration of cooking liquor in relation to moisture content, chips, etc. The utilisation of waste sulphite liquor has been studied; also chipping, drying and baling of pulp for shipment. Other studies cover the relation of humidity and temperature to moisture content of woods. Blotting paper has also been manufactured at the laboratories for the first time in Canada.

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All communications should be addressed to

The British Alizarine Co., Ltd.
Trafford Park, Manchester

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

HARRISON, Richard H., 63, New Cross Road, S.E., metallurgical chemist. (C.C., 19/5/23.) £13 15s. March 29.

LENGS, LTD., 205, High Street, Acton, chemist. (C.C., 19/5/23.) £14 18s. 2d. March 15.

MAYOUS, LTD., 170, Alum Rock Road, Saltley, Birmingham, chemists. (C.C., 19/5/23.) £16 17s. 3d. April 4.

WILLY, H., AND SONS, 120, Katherine Road, East Ham, dyers. (C.C., 19/5/23.) £11 13s. 4d. March 15.

Receiverships

BURDIN AND CO., LTD. (R., 19/5/23.) W. M. Oddie, of Ossett, Yorks, was appointed receiver on April 28, 1923, under powers contained in instrument dated May 24, 1919.

CLARENDON CHEMICAL CO., LTD. (R., 19/5/23.) S. Chesterfield, of the Grafton Hotel, Tottenham Court Road, W.1, was appointed receiver and manager on May 1 under powers contained in debenture dated March 5, 1923.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

CLAYTON GLUE WORKS, LTD., Manchester. (M., 19/5/23.) Registered May 2, £3,550 debentures; general charge. *Nil., May 25, 1922.

KEENE'S ONE-NIGHT CURES, LTD., London, W.C. (M., 19/5/23.) Registered May 3, £3,050 debenture, to H. Newhouse, 158, Newmarket Road, Norwich; general charge.

Satisfaction

BLEACHERS' ASSOCIATION, LTD., Manchester. (M.S., 19/5/23.) Satisfaction registered May 5, £50,000, registered September 11, 1912.

London Gazette

Company Winding Up

CARLTON BLEACHING AND DYEING CO. (THE), LTD., Marhill Road, Station Road, Carlton, Nottingham. (C.W.U., 19/5/23.) Winding-up Order, May 8, 1923.

Bankruptcy Information

CALVERT, Jackson, "Wagaraw," Greenhead Road, Huddersfield, Yorks, manufacturing chemist. First meeting, May 18, 10.45 a.m.; and public examination, June 11. 11 a.m., County Court House, Queen Street, Huddersfield.

PHILLIPPS, Elsie Irene (Spinster), lately carrying on business at 18, St. Mary's Row, Moseley, Birmingham, pharmacist. (R.O., 19/5/23.) Receiving order, May 11. Debtor's petition.

Companies Winding Up Voluntarily

BROWN (H.) AND CO. (HULL), LTD. (C.W.U.V., 19/5/23.) Stanley Scotter, incorporated accountant, Lloyd's Bank Chambers, Hull, appointed liquidator.

COMBE DOWN DRUG STORES, LTD. (C.W.U.V., 19/5/23.) William Frederick Rice, Byfield House, Combe Down, near Bath, appointed liquidator.

Notice of Intended Dividend

SKEAT, Charles, 609, High Road, Tottenham, chemist and druggist. Last day for receiving proofs, May 29. Trustee, P. S. Booth, 28, Kimberley House, Holborn Viaduct.

New Companies Registered

BALTIC AND MERCANTILE SHIPS COMPOSITIONS, LTD., 70, Finsbury Pavement, London, E.C.2. Chemists, druggists, drysalters, importers, manufacturers of and dealers in pharmaceutical, chemical, industrial and other preparations. Nominal capital, £3,000 in 1,500 7 per cent. preference shares of £1 and 15,000 ordinary shares of 2s. each.

BOYD, STEWART AND CO., LTD. Dealers in paint, varnish, grease, oil, colours, etc. Nominal capital, £10,000 in 7,000 ordinary shares of £1 each and 3,000 preference shares of £1 each. Solicitors: J. and J. Stewart and Young, 4, Parliamentary Road, Glasgow.

JAMES AND WILLIAM BROWN, LTD., 7, West George Street, Glasgow. Coke and chemical manufacturers. Nominal capital, £50,000 in £1 shares.

CHILDS AND CO., LTD.—Manufacturers of and dealers in cement, lime, clay, minerals, fuel, fertilisers, etc. Nominal capital, £500 in £1 shares. Solicitors: A. S. Wearing, 47, Queen Street, Wolverhampton.

CLIMAX AMALGAMATED, LTD., 25 and 26, Lime Street, London, E.C. Chemists, druggists, drysalters, oil and colourmen, etc. Nominal capital, £10,000 in £1 shares (8,000 7 per cent. non-cumulative participating preference and 2,000 ordinary).

KENNEDY'S GLASS WORKS, LTD.—Plate and sheet glass merchants, glass benders, polishers, etc. Nominal capital, £20,000 in £1 shares (7,500 6 per cent. cumulative preference). Solicitors: Francis and John, 62, London Wall, London, E.C.

J. R. LATEWARD, LTD., 743, Oldham Road, Newton Heath, Manchester. Pharmaceutical, manufacturing, and general chemists and druggists, drysalters, oil and colour merchants, etc. Nominal capital, £500 in £1 shares.

WAVERLEY LUBRICANTS, LTD., Tower House, 40, Trinity Square, London, E.C.3. Manufacturers, refiners, blenders, importers and exporters of and dealers in oils, greases, varnishes, etc. Nominal capital, £1,000 in 900 non-cumulative preference shares of £1 and 1,000 deferred ordinary shares of 2s.

ANDREW WOMERSLEY AND SON, LTD., Mill Lane Works, Mill Lane, Bradford. Manufacturers, refiners and preparers of oils, greases, varnishes, soap, chemicals, etc. Nominal capital, £20,000 in £1 shares.

Bell's United Asbestos Co., Ltd.

THE thirty-fifth ordinary general meeting of the shareholders of Bell's United Asbestos Co., Ltd., was held on Thursday, May 10, at the Cannon Street Hotel, London, E.C., Mr. J. Alfred Fisher (chairman and joint managing director) presiding. In the course of his speech the chairman said he heartily endorsed the advice given recently to "Get the highest possible quality, lower the price to the smallest point consistent with a commercial profit, look into every item of management, and put your backs into it." He also referred to the amalgamation during the past year of the "Poilite" (asbestos-cement) section of the company's business (including the plant for making building slabs) with that of the British Everite and Asbestilite Works, Ltd., of Manchester, under the name of "Bell's Poilite and Everite Co., Ltd." Though in proceeding with the negotiations they considered that in the present state of trade, and with the low and unremunerative prices now ruling, they might be taking some risks, the position on the whole should be strengthened by co-ordinating the manufacturing and selling arrangements of the two concerns. He also referred to the connection of the company with the Raybestos Co., of Bridgeport, in the United States, which had the same liability to subscribe additional working capital, but as this company held a majority of the fully-paid shares, the liability in both cases could only become operative with the consent of the Bell company's nominees on the board of the Raybestos-Belaco Co.